Architect's Stainless Steel Library

A. I. S. I. DATA SHEETS

THE INTERNATIONAL NICKEL COMPANY, INC.

PREPARED IN COOPERATION WITH COMMITTEE OF STAINLESS STEEL PRODUCERS, AMERICAN IRON AND STEEL INSTITUTE

Stainless Steel

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 1

Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.

STAINLESS STEEL FOR MAINTENANCE ECONOMY

The architect can contribute most to the future maintenance economy of a building he designs. By choosing maintenance-free or low maintenance materials, and applying them properly, the architect can save the building owner a great deal of money in future operating bills.

Cost comparison of building materials is unrealistic if only initial outlay is considered. The total cost includes insurance, maintenance, custodial care, replacement, and other long-range items. Of these, maintenance is generally the highest.

Stainless steel is recognized as a long-lasting, easily-maintained material for both inside and outside architectural applications. Its smooth, dense surface and corrosion resistance reduce dirt adherence, and hence maintenance, to a minimum.

SELECTION OF PROPER TYPE OF STAINLESS STEEL

An architect need be concerned with only a few types of stainless steel, all of which provide excellent low maintenance properties. Type 302 is the general, all-purpose grade. It is easily formed and fabricated by experienced metal manufacturers. Welded joints are strong, tough and corrosion resistant, and blend well with the parent metal when ground and polished. With excellent corrosion resistance, it is normally used for exterior applications in urban, industrial and rural areas. Type 202 stainless steel is an effective alternate for type 302.

Marine and highly corrosive industrial atmospheres may require use of the still more corrosion resistant, Type 316 stainless steel. However, use of this grade is most often restricted to particularly severe conditions.

Type 430 stainless steel closely resembles Type 302 in fabrication and service. It is generally recommended for interior applications, although much exterior architectural work around entrances and store fronts has been done successfully in this grade.

Routine maintenance with commercial cleaners is all that is necessary to keep stainless steel looking new for the life of the building. In out of reach applications where maintenance is impossible, stainless steel will not corrode despite many years' accumulation of urban and industrial dirt, grime and contaminated atmosphere.

SELECTION OF PROPER FINISH

When considering future maintenance, the architect should base his selection of finish on whether the application is in a traffic area likely to receive abuse, such as entrances, doors, stairs, convectors, etc.; or in an out-of-reach area, such as curtain wall panels, mullions, cooling towers, coping, flashing, etc.

For applications in contact areas, a No. 4 mill finish is recommended. It will not show fingerprints as readily as some of the less reflective finishes, and can be cleaned more vigorously without danger of changing its appearance. Because the finish is obtained by grinding and polishing, it can be reproduced after fabrication. Therefore, this finish is often specified when welds or fabrication markings must be removed in eye-level installations.

For areas not subject to traffic, the architect can select one of the less reflective finishes if he so desires. For large, flat areas of stainless steel, such as curtain wall spandrels, column covers, and the like, No. 2D, a soft, non-reflective, cold-rolled finish is suitable.

No. 2B is a bright, cold-rolled finish similar to, but somewhat brighter than 2D. The surface is moderately reflective and is often specified for gentle highlighting in mullions, col-

umn covers (normally above ground level), and windows.

Since Nos. 2B and 2D are rolled finishes, they cannot be matched by subsequent mechanical finishing, so special care must be taken to protect the surface in fabrication, transit and erection to preserve appearance.

TEXTURES AID MAINTENANCE ECONOMY

Stainless steel sheet and strip is now available in a wide variety of special textured finishes. One texturing process rolls a pattern through the metal, others emboss one side. Textured stainless steel can be a great aid to maintenance since it provides increased protection against scratches, dents and fingerprints. In particularly rugged areas such as free-standing columns, door and sidelight panels, use of textured stainless is becoming more and more frequent.

DESIGNING FOR MINIMUM MAINTENANCE

By combining the superior wear and corrosion-resisting characteristics of stainless steel with good design considerations, the architect can help reduce long-term maintenance costs.

On exterior applications out of easy reach where air-borne dirt accumulations are impossible to prevent, the detailing of patterns, joints, and other components of curtain walls must be considered for long-term maintenance, as well as for immediate esthetics. Design can aid maintenance by following these general hints:

- In larger panels, use the smoothest finish, whether flat or textured, which will provide the appearance desired and the rigidity necessary.
- In achieving rigidity or variation of appearance through textures or patterns, use vertical impressions. Horizontal shapes collect more dirt,

Proof of stainless steel's permanence in architectural applications is offered by the unretouched photos below. At left is the escalator installation in the Philadelphia Savings Fund Society Building. The escalators were installed thirty years ago and the stainless steel is still in excellent condition.

At right is the tower on the Chrysler Building in New York City. In 1961, the stainless on the tower was cleaned for the first time in 31 years. At the time this photo was taken, the top half of the tower and a strip down the left side had been cleaned. The stainless was found to be in perfect condition.

and can cause subsequent uneven streaking of lower areas.

• Avoid designs which concentrate flow of water on an exterior surface, since this too will cause streaking. Overhangs should project beyond any lower building areas to avoid splatter or concentration of dirt-carrying water through drippage.

• Avoid or minimize horizontal surfaces, such as soffits. When used, drips and weep holes should be employed to channel dirt drainage.

• Joints should be designed to minimize dirt accumulation. Detailing should provide for speedy drainage of water which may penetrate joints.

• Confine drainage to the rear of the panels to avoid streaking on the outer surface. Joint faces should include a device to eliminate capillary action.

• Struts, clips and the like, when made of another metal, should be insulated from the stainless steel by bitumastic or similar insulators to prevent corrosion or possible unsightly "bleeding" of other metals.

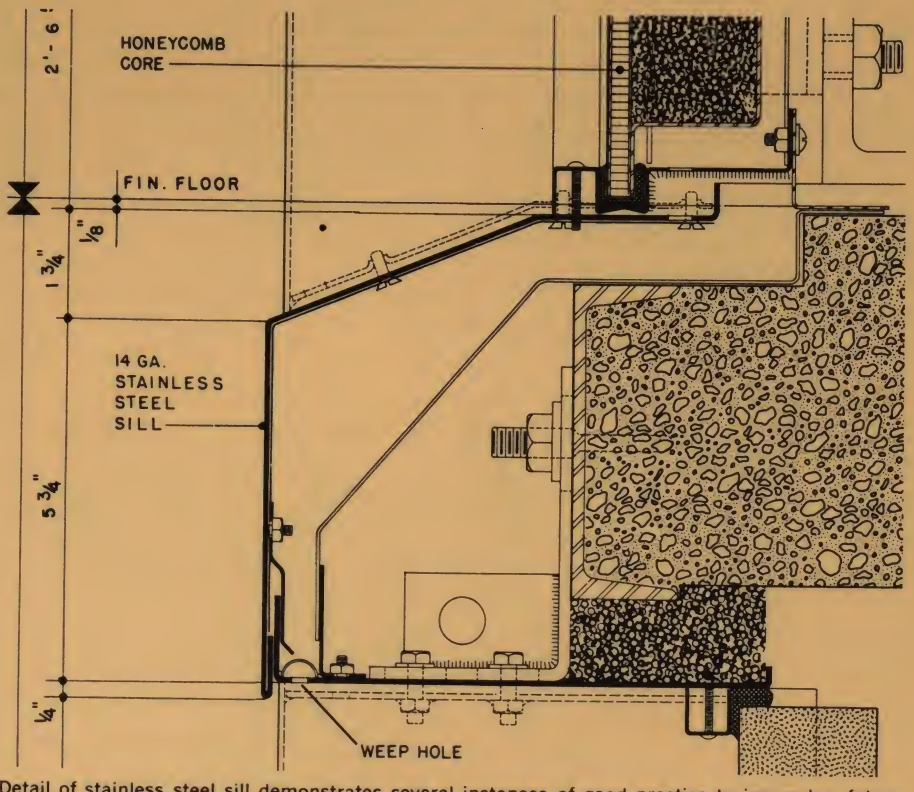
• Eliminate drainage from other materials, such as chloride-bearing cements, slag roofs and other corrosive materials.

• Fasteners should be concealed as much as possible for esthetic reasons, and should have corrosion resistance equal to or better than the panel material to eliminate later repairs.

• Applications within hand's reach generally receive regular maintenance and should be designed with a minimum of fine details which might collect dirt or slow easy cleaning.

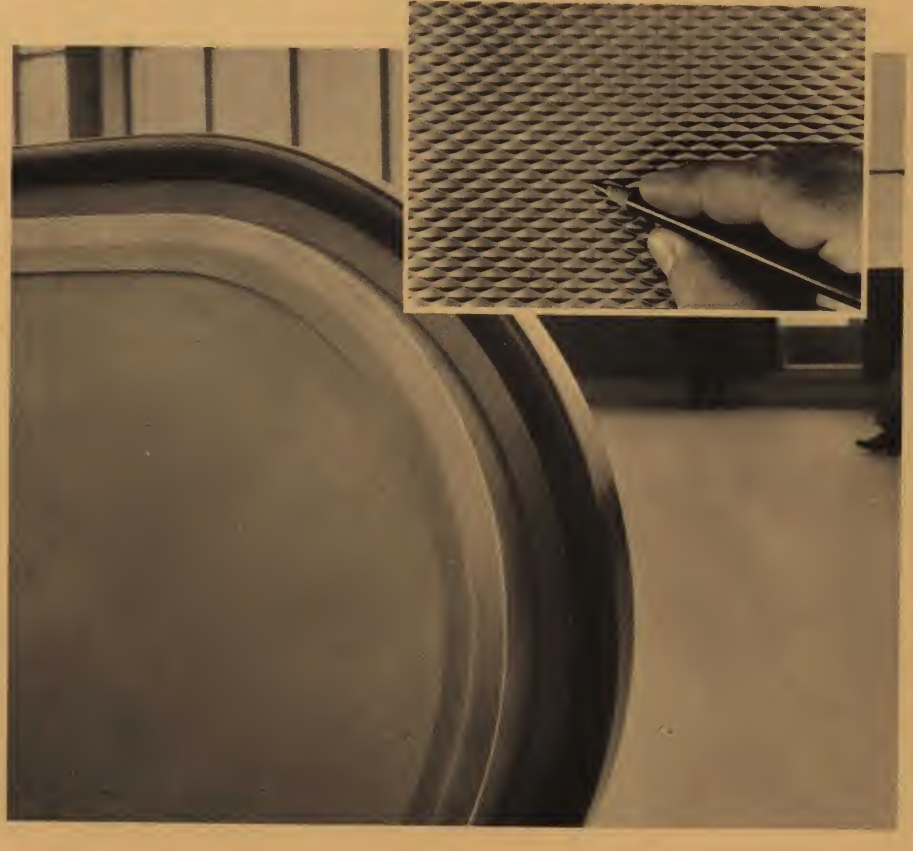
SPECIFICATIONS FOR FINAL CLEANING

The architect's specification should make clear to all trades whose work adjoins the stainless steel, or those who use acids or other materials which could be damaging, that suitable precautions against damage must be maintained. If possible, all brick work should be completed and acid



Detail of stainless steel sill demonstrates several instances of good practice to insure low future maintenance—incline on upper surface on the wide member aids drainage; drip at bottom face prevents water from running back along underside of member; and weep hole near face of member drains water well away from face of panel below.

The inside of this escalator in a busy air terminal is sheathed with textured stainless steel. The pattern in the metal provides great resistance to scratching, scuffing and denting, and is being used frequently to lower maintenance costs.



cleaned before stainless steel is introduced to the job. Chloride-bearing cements should be prohibited or used under carefully controlled conditions after the stainless steel is installed.

It is recommended that responsibility for final cleaning of the stainless steel, particularly all exterior applications, be assigned to the general contractor. Often, the wall contractor and erector is off the job site long before all construction work is completed. If the wall contractor does the cleaning, he should do so after the general contractor considers the building completed.

The architect can be helpful to the building owner in his day-to-day job of caring for his property. Once the building is turned over to the operator, the architect can suggest the following table of materials and methods for periodic cleaning of various parts of the structure.

EFFECTIVE CLEANING METHODS

Condition	Cleansing* Agent	Method of Application	Effect on Finish
For normal atmospheric and construction dirt	Soap, or ammonia, or detergent and water	Sponge or rag; rinse with clear water; wipe dry	No effect
For heavier dirt containing oil or grease	Organic solvents: ether, acetone, alcohol, benzol, benzine, xylol, etc.	Sponge or rag; rinse with clear water; observe safety rules	No effect
	5 to 15% caustic soda, 6% solution of sodium metasilicate, trisodium phosphate, etc.	Same as above	No effect
For rust discoloration from other materials	Oakite #33, one part in two parts water	Clean cloth or sponge; let stand 20 min.; rinse; repeat and let stand longer if necessary	No effect on stainless. Can harm paint, wood, or fabrics. Wear rubber gloves, goggles, apron
For deposits which require scouring	Grade FFF Italian pumice, whiting, Bon Ami	Rub with damp cloth	No effect
	Liquid Nu-Steel, Perma-pass	Rub with small amount on dry cloth	No effect; use light pressure
	Steel Bright	Rub with small amount on dry cloth	No effect; use light pressure
	Paste Nu-Steel or DuBois Temp	Rub with small amount on dry cloth	No effect on satin finish; may scratch mirror finish
	Cooper's Stainless Cleaner	Rub with damp cloth	Satisfactory for satin finish
	Allen Stainless Steel Polish	Rub with damp cloth	Scratches, but leaves mirror reflection
	Household cleaners: Bab-O, Old Dutch, Sunbrite, etc.	Rub with damp cloth	May scratch satin finish slightly

*Use of proprietary names is intended only to indicate a type of cleaner, and does not constitute endorsement by the Committee.

Just inside a glass-walled terminal building, this convector cover receives a great deal of abuse. The architect solved future maintenance problems by specifying a heavier-weight stainless steel (10-gauge) to resist buckling and denting.

No. 1 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.

26217M

Stainless Steel

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 2

Committee of Stainless Steel Producers • American Iron and Steel Institute

633 Third Avenue, New York 17, N. Y.

DETAILING COLUMN COVERS

Columns of all shapes and sizes can be covered with stainless steel, achieving beauty, protection against wear, durability, and economy of maintenance time and costs.

GRADES AND FINISHES

For interior columns, Type 430 stainless steel combines excellent properties with economy. For exterior columns, where greater corrosion resistance is required, Types 302, 202 or 304 stainless steels normally are specified with excellent results.

Many finishes are available in stainless steel, but No. 4, sometimes called "satin" finish, is most frequently specified for ground-floor applications, including column covers. It is well suited for jobs involving welding since the weld surface can be blended by polishing to match the surrounding surface.

COLUMN DESIGN TIPS

• Stainless steel is stronger than other architectural metals. Therefore, you can consider using lighter gauges without jeopardizing column protection and appearance.

• Design of larger components, and shop assembly of larger units, is possible since stainless steel's strength reduces chance of damage during handling and transportation.

• New textures and laminated panels encourage design variation, and can be employed for even greater rigidity and optical flatness.

• Economical design is aided by use of standard or easily formed shapes.

• Stainless steel fasteners have the same high level of corrosion resistance and prevent unsightly bleeding of corrosion products.

• Column covers can also conceal piping. Of course, access must be provided in case pipes should need repair.

• For very slender columns in commercial buildings, an economical "one-piece" cover can be designed in stainless steel. One supermarket chain employs stainless covers for columns six to eight inches in diameter. A sheet of 20-gauge stainless is cut to fit the column, then its edges are reverse bent. A stainless slide, bent into a flat "C", is then clamped over the cover to hold it in place. Some of these covers have been in service 30 years and are still in good condition.

No. 2 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.

STIFFENING METHODS

Stainless steel column covers require less internal stiffening because of the strength of the material. However, additional stiffening may be required to control optical distortion or resist heavy traffic abuse, and can be handled in one of several fashions.

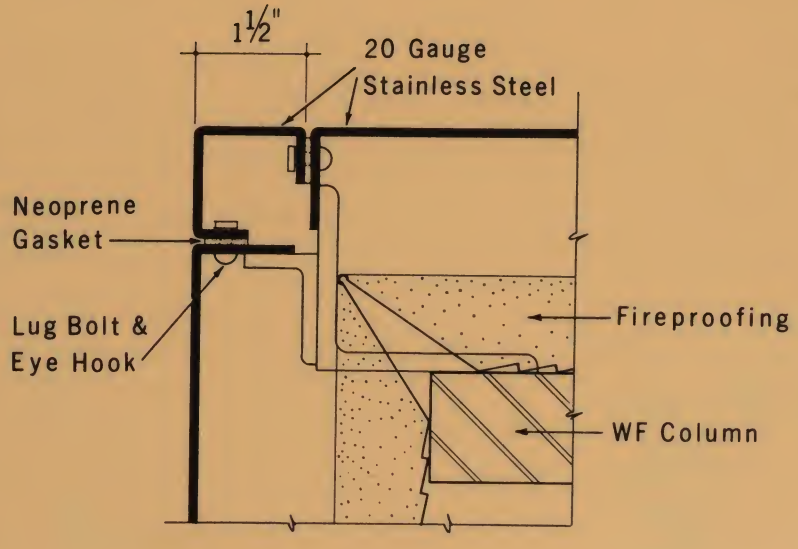
1. A heavier gauge can be employed, but this increases costs and is only partially effective.

2. Use of textured stainless steel, or panels with deep-formed patterns such as fluting, is effective and more economical. Slightly increased cleaning difficulty may be expected.

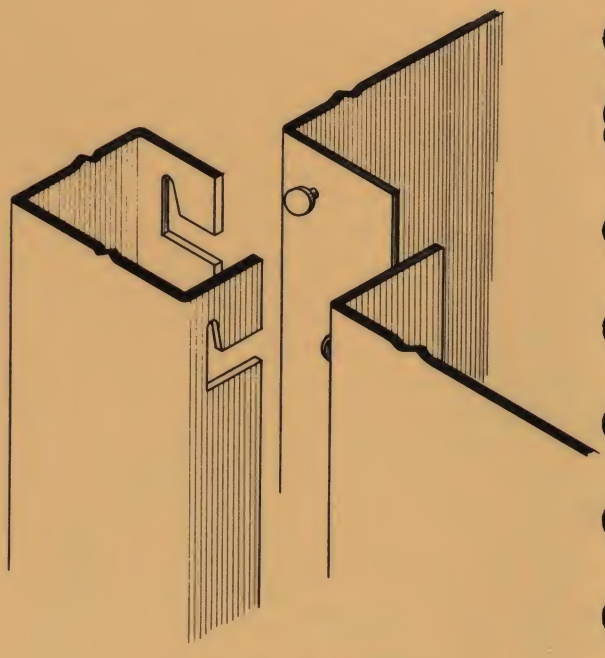
3. Use of internal members is the most common form of stiffening for column covers. Requirements for these members depend largely on the size and shape of the column. Large flat column faces with fixed corners require some stiffening to resist distortion. Experience indicates members should be spaced about six inches apart on 20-gauge stainless steel, and about double that interval for 16-gauge. Greater resistance to mechanical abuse is possible through use of stronger, higher moment sections, progressing from simple bar to channel stiffeners, or to a grid of reinforcement for particularly bad conditions.

4. Another stiffening method, also frequently used, is back-up: face panels of stainless steel strongly bonded to flat, board-like materials or honeycomb. This stiffening method is perhaps the best means for controlling optical distortion of flat surfaces.

The following pages show how architects and metal fabricators solved column cover requirements in six different installations. They may suggest ways to meet your own design needs.

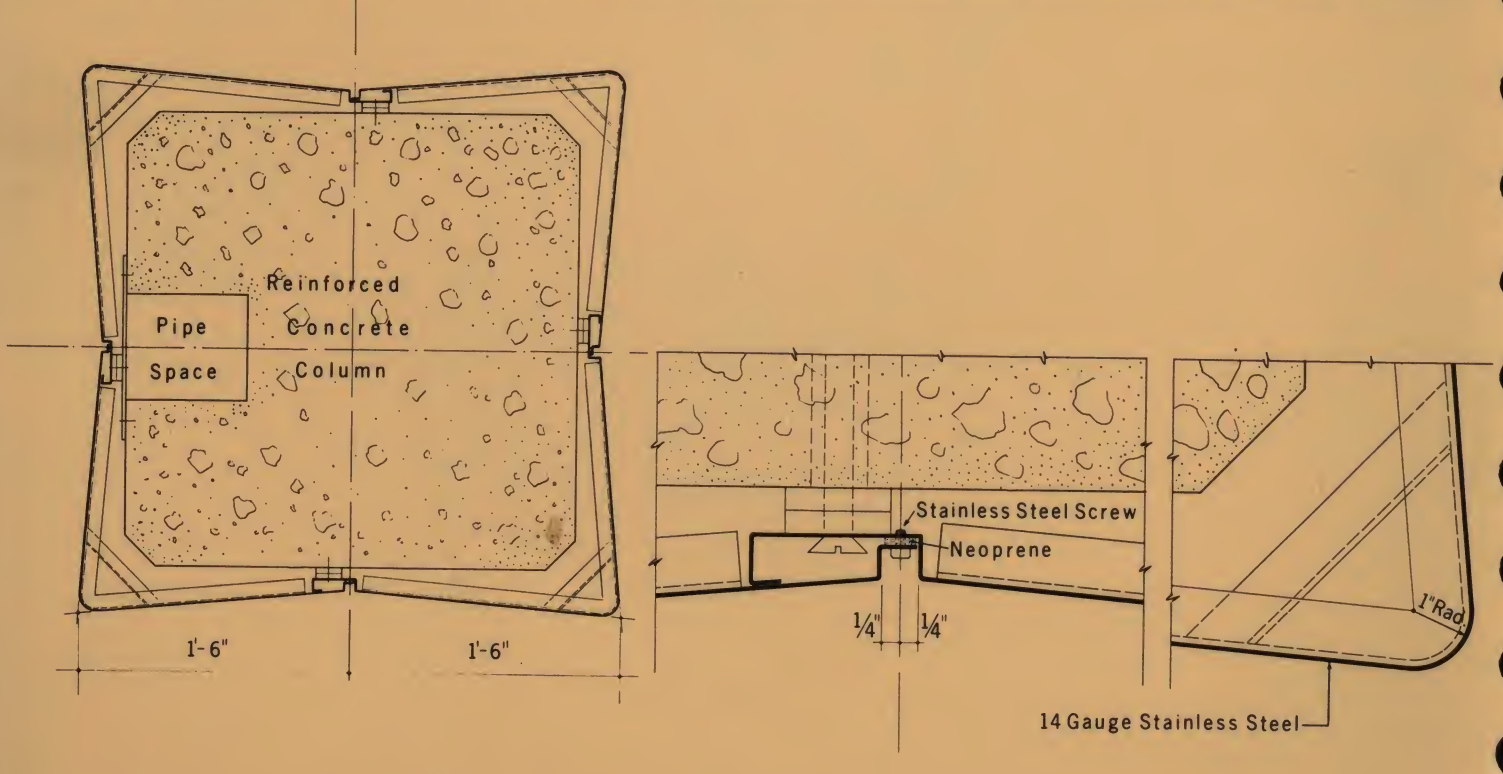


TYPICAL COLUMN CORNER



ISOMETRIC OF CORNER CONNECTION

ABOVE Corner detail of simple free-standing column with hidden fasteners. Column is only 13 inches square, and 12-gauge stainless cover needs no backing. Isometric reveals lug bolt and eye hook connection for attachment of corner piece. A bolt at the top of the column prevents accidental removal of the corner piece. **Public Service Company of Colorado,** Denver, Colo. Berne, Muchow, Baume and Polivnich, Architects. **BELOW** Variation of a design for a square column cover. Stainless steel screws, set in a gutter, fasten the covers to steel back-up. Neoprene strip provides added waterproofing. **Philadelphia State Office Building,** Philadelphia, Pa. Harbeson, Hough, Livingston and Larson, Architects. Albro Metal Products Corp., metal fabricator.

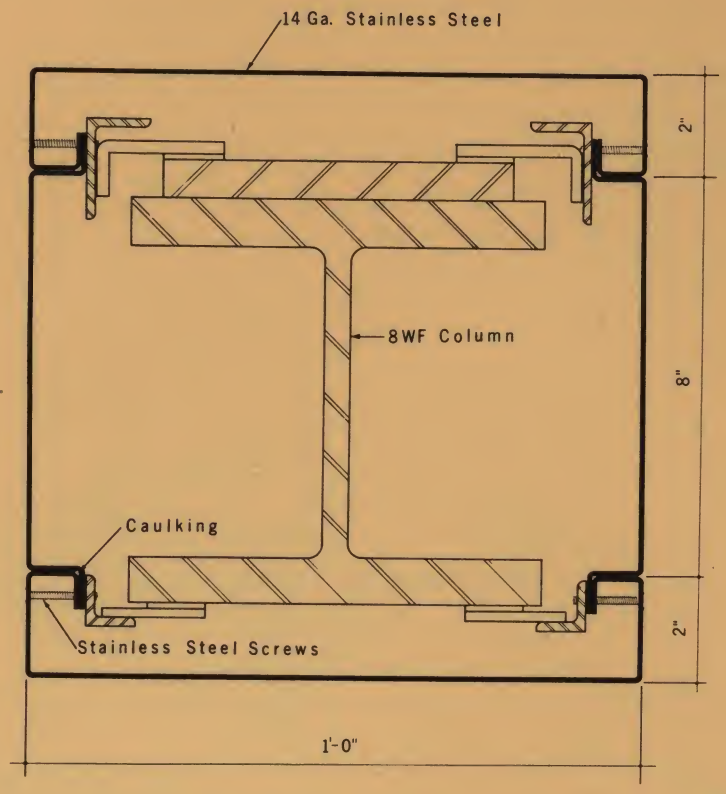


PHILADELPHIA STATE OFFICE BUILDING

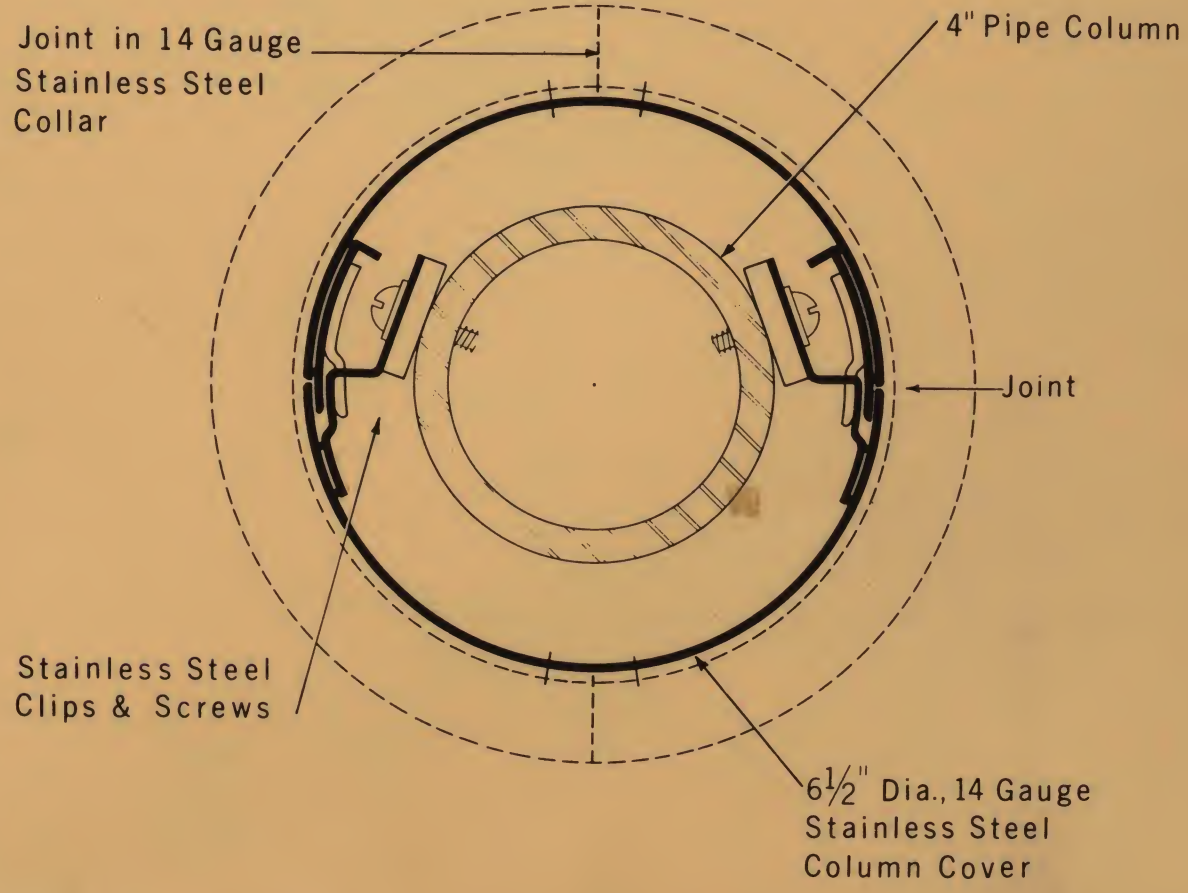
WESTERN ELECTRIC BUILDING

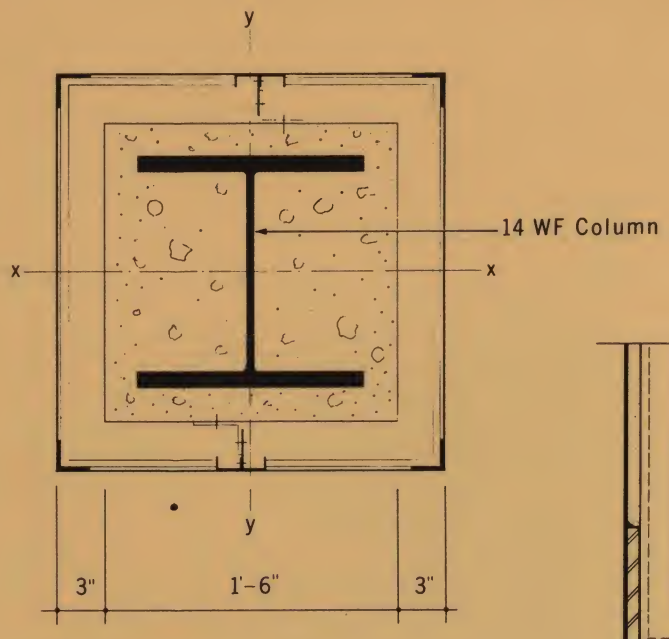
IBM EDUCATIONAL BUILDING

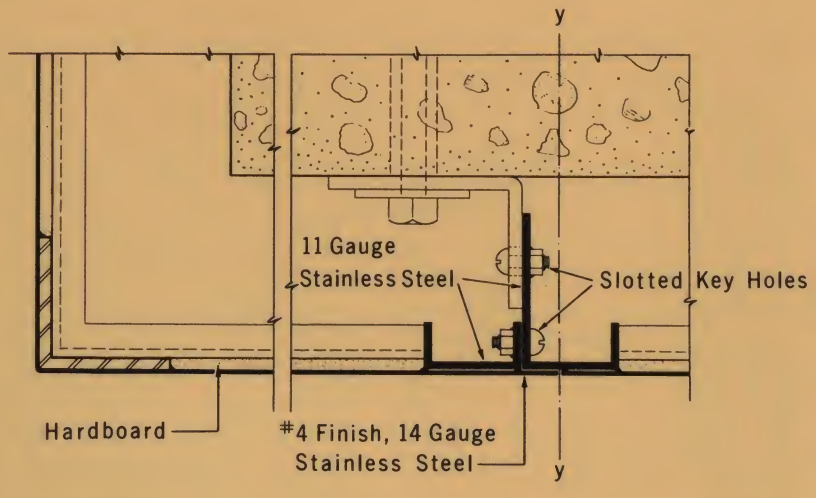
ELMHURST GENERAL HOSPITAL



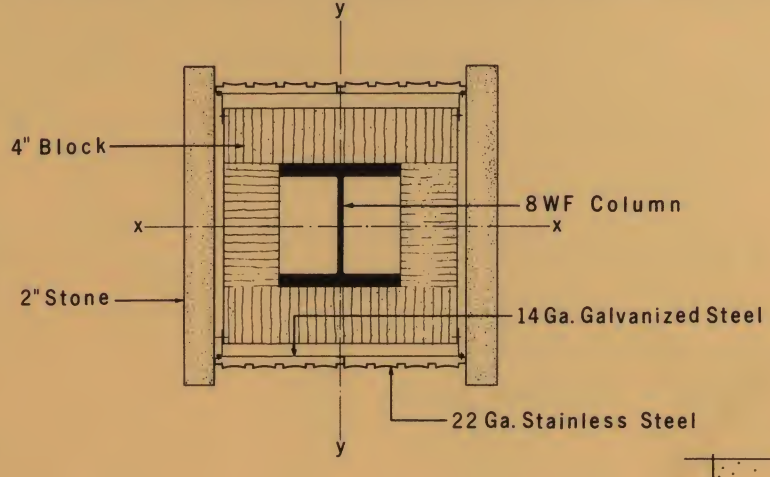
ABOVE Neat design of one-foot-square stainless steel column cover attached with stainless Phillips O.H.M.S. to steel angles. Three "Z" stiffeners are spaced equally apart to reinforce the cover of the 11-ft 9-inch high columns. **IBM Educational Building,** Poughkeepsie, N. Y. Eliot Noyes and Associates, Architects. Trio Industries, Inc., metal fabricator. **BELOW** Detail for stainless steel pipe column cover. One-half of the cover is bolted as shown. The other half is held by friction fit plus ceiling collar, leaving only hairline joints and no visible fasteners. Dotted line shows location of stainless steel collar at ceiling. **Elmhurst General Hospital,** Elmhurst, N. Y. York & Sawyer; and Fellheimer & Wagner, Architects. General Bronze Corporation, metal fabricator.

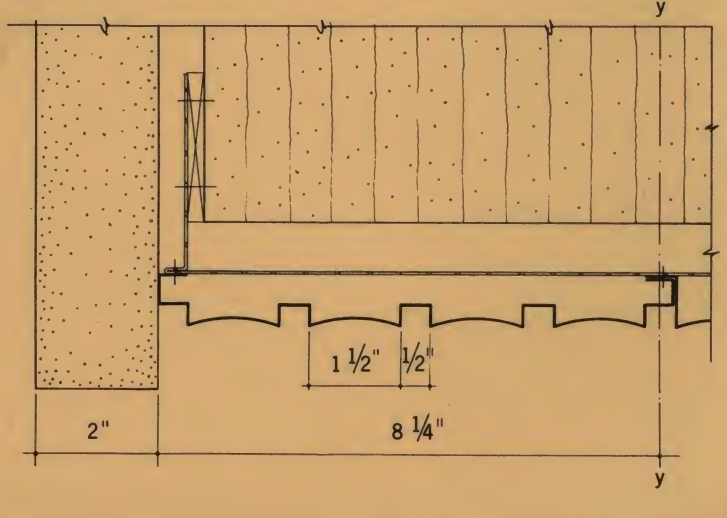






ABOVE This two-piece cover protects a two-foot square column. Hardboard backing provides extra insurance against distortion and damage in heavy traffic area. Cover is unbroken except for two hairline joints. **Western Electric Building,** New York City. Shreve, Lamb and Harmon Associates, Architects. Allied Bronze Company, metal fabricator. **BELOW** Stainless steel and marble-faced column cover is 16½ inches square. 22-gauge stainless steel panels are fluted for stiffness and decorative effect, and attach at two points to galvanized steel back-up. **Buffalo and Erie County Public Library,** Buffalo, N. Y. James W. Kideny & Associates, Architects. The Michaels Art Bronze Company, metal fabricator.





STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 3
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.

DETAILING GLAZING APPLICATIONS

Large areas of fixed glass give an open, inviting look to many modern structures. Banks, office buildings, all types of stores and shops are being designed with expanses of glass supported only by slender structural sections.

Strong, light stainless steel members, or stainless steel-covered structural sections, are frequently selected for mullions, jambs and transoms in these designs. Types 302 or 202 stainless steel with a No. 4 finish are generally used for exterior applications. Type 430 is another possible alternate. Gauge depends on design of the member, but stainless steel can be used in lighter gauges than other metals because of its greater strength.

GENERAL GLAZING DESIGN TIPS

• To keep down costs, details should be able to be handled by regular sheet metal techniques. Simple straightline bends are easy to form. Avoid short return bends or jogs which make working difficult.

• Stainless steels are readily welded, and the work area can be blended for color and finish. Spot-welding does not damage the surface and refinishing is minimized or completely eliminated.

• Metal thickness can be reduced by designing formed sections or using standard round or square shapes. Clamping devices can stiffen sections while they are being installed.

• Designers should incorporate as many standard or stock forms as possible to take advantage of the close tolerances, sharply defined shapes, and low costs available through mass production.

• Stainless steel's strength permits a maximum of shop fabrication which encourages speed, accuracy, and lower costs. If field work is required, however, much mechanical work can be performed on stainless steel with common power tools.

FASTENING CONSIDERATIONS

Always use stainless steel fasteners. Corrosion products from non-stainless fasteners can streak and mar the entire installation.

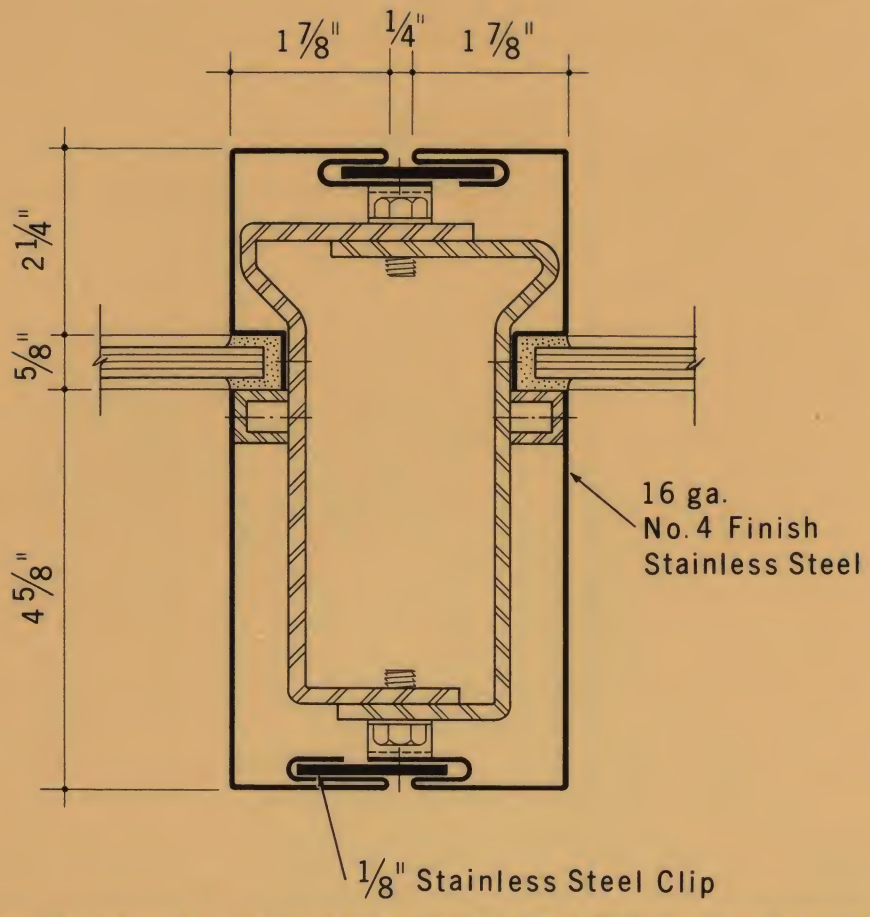
Fasteners which go through a metal face must be located carefully. This will eliminate the need for extra gauge to resist distortion when fasteners are pulled tight.

The number of exposed fasteners can be reduced by designing them to be hidden under the glass.

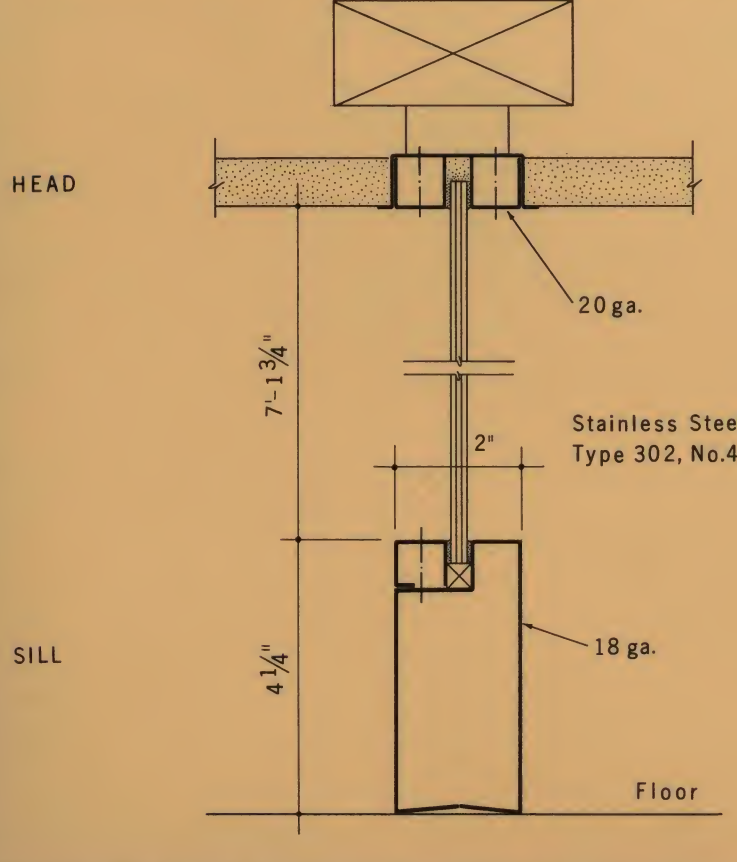
A simple fastening device for mullions uses a bolt tightened from the inside. The nut is fastened to a hat channel so that the pull of the fastener is distributed over a greater area of the mullion face. Another precaution against "dimpling" is placement of reinforcing pads under screw heads.

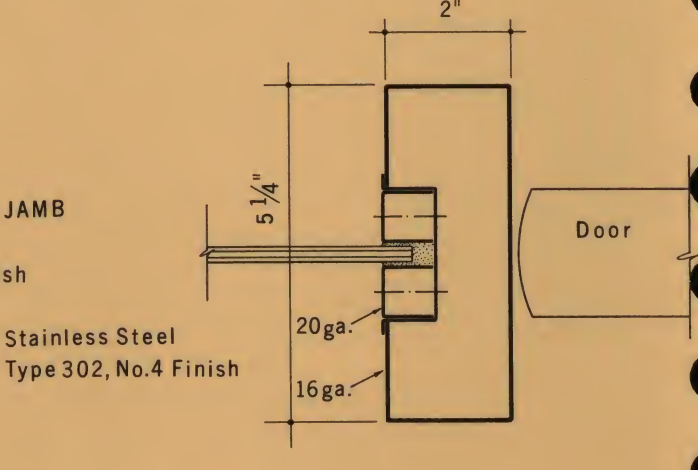
The following pages show how architects and metal fabricators have solved glazing requirements in several different types of installations. They may suggest ways to meet your own design needs.

No. 3 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.



ABOVE A deep vertical mullion for the window wall of the **Lafayette National Bank of Brooklyn,** New York, shows three different fastener locations: through the stainless clip inside the seam, hidden by the glass in the gutter, and just inside the glass. The clip arrangement allows for expansion and contraction. Philip Birnbaum, architect. George F. Driscoll Company, general contractor. Albro Metal Products Corporation, metal fabricator. **BELOW** Head, sill and jamb details of an interior entrance to the **Bank Building & Equipment Corporation** office shows extensive use of stock stainless steel molding sections. Available in standard lengths and basic shapes, the moldings can be combined to solve many glass-holding designs. Russell Glueck, designer. Bank Building & Equipment Corp., general contractor. Schacht Associates, Inc., metal fabricator and supplier of stock sections.



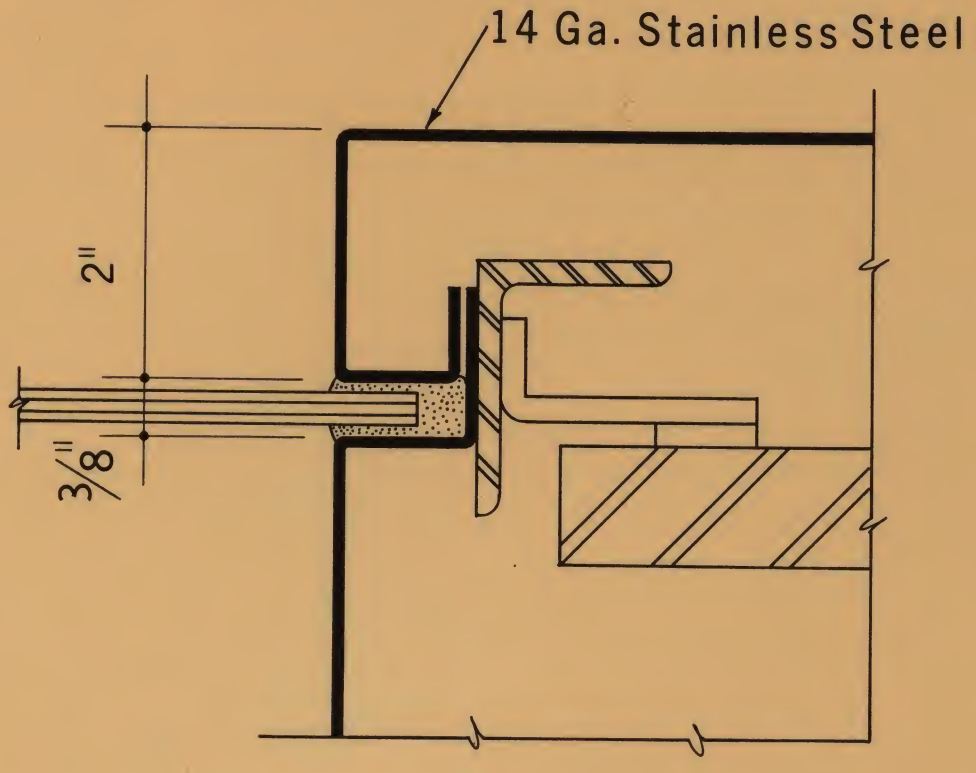


LAFAYETTE NATIONAL BANK OF BROOKLYN

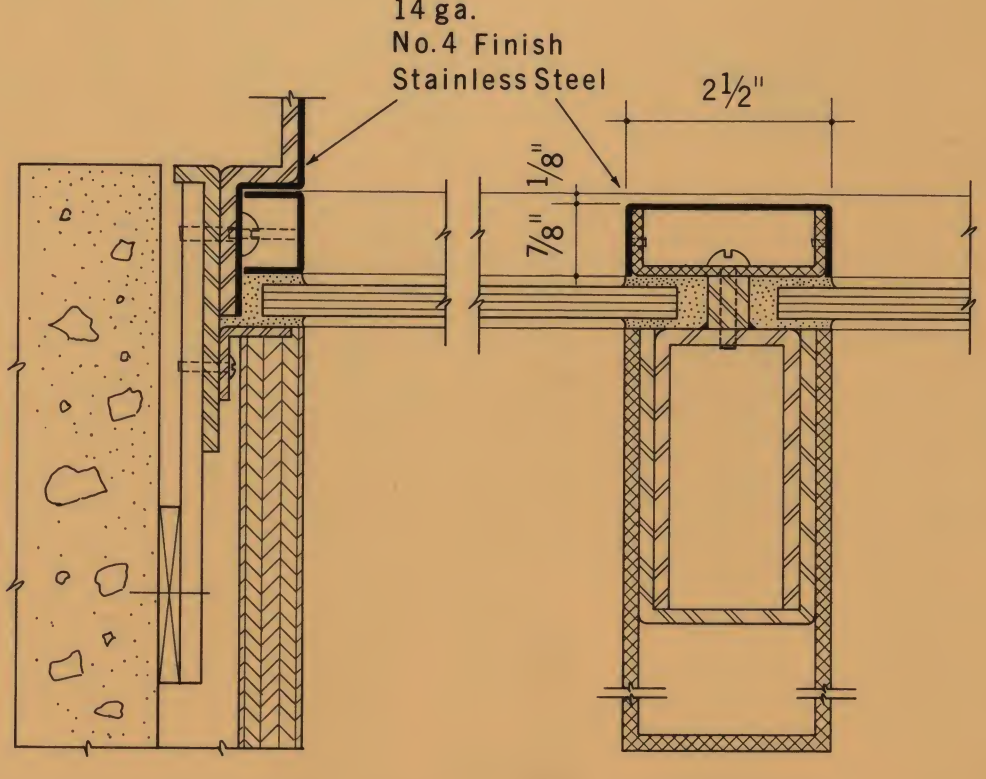
BANK BUILDING AND EQUIPMENT CORP.

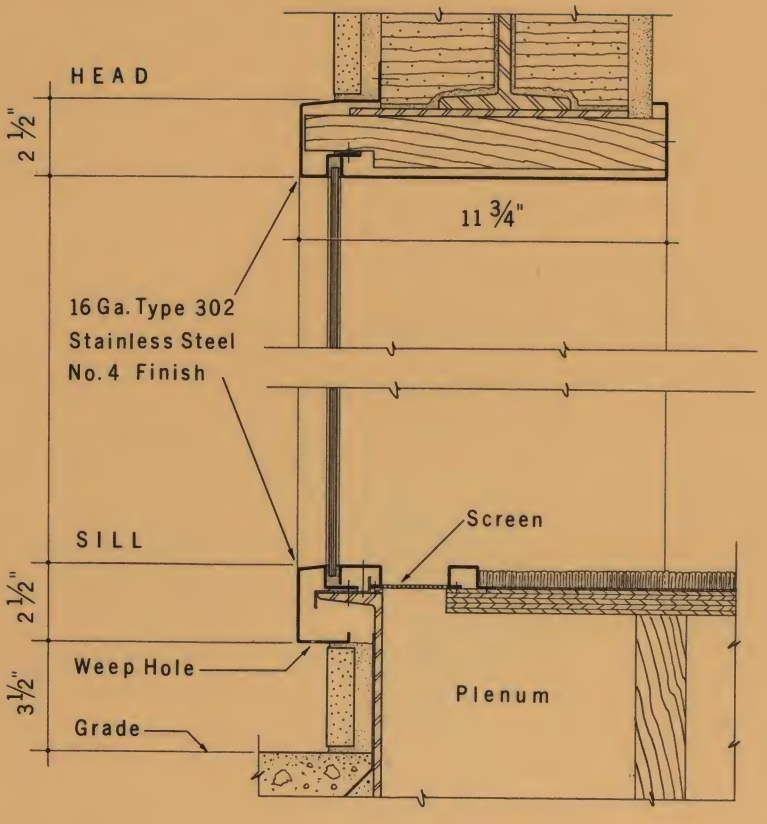
HUDSON NORTHLAND SHOPPING CENTER

PRUDENTIAL INSURANCE CO.

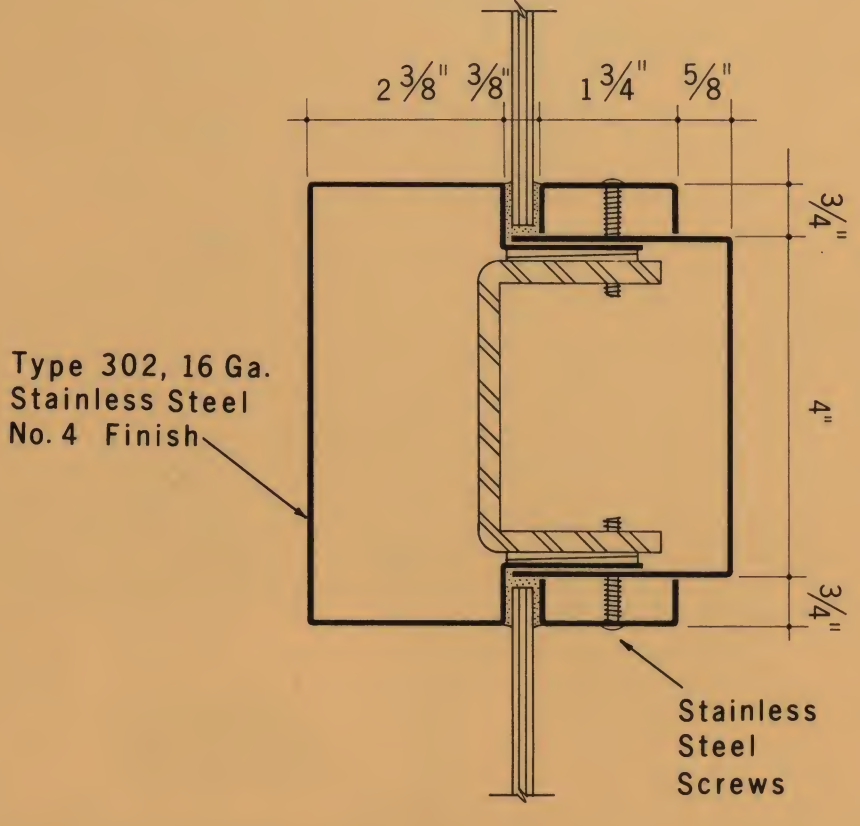


ABOVE A simple detail for combining an expanse of glass with a stainless steel column is shown on the **IBM Educational Building,** Poughkeepsie, N. Y. The column is one-foot square. The column cover is secured along two inner faces by recessed stainless Phillips OHMS. Eliot Noyes & Associates, architect. Walter A. Stanley Construction Co., general contractor. Trio Industries, Inc., metal fabricator.
BELOW A mullion and jamb-at-column detail from the new **Western Electric Building,** New York City, demonstrates a simple design using recessed stainless Phillips OHMS to fasten the removable mullion cap and glass bead. Shreve, Lamb, and Harmon Associates, architect. George A. Fuller Construction Company, general contractor. Allied-Superb Bronze Corporation, metal fabricator.





ABOVE Head and sill details from a display window at the **Hudson Northland Shopping Center,** Detroit, Mich., demonstrates a simple design with hidden fasteners that has proven leakproof through nearly ten years' service. Glass height is 8 ft., 7½ in. Victor Gruen, architect. Bryant & Detwiler, general contractor. Moynahan Bronze Company, metal fabricator. **BELOW** Two inside fastening locations using stainless Phillips OHMS hold this horizontal member together on the **Prudential Insurance Company** building, Chicago, Ill. A ¼-inch continuous steel channel provides minimum but adequate back-up. Kress & Murphy, architect. George A. Fuller Construction Company, general contractor. Michaels Art Bronze Company, metal fabricator.



Printed in U.S.A. 56217M

STAINLESS STEEL ARCHITECTURAL DATA SHEET **NO. 4**

Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.

DETAILS OF STAINLESS STEEL CURTAIN WALLS

There is no doubt that metal curtain wall will continue indefinitely as a common method of building. Such benefits as light weight, reduced construction time, and greater floor space recommend metal curtain wall design for all types of non-residential jobs.

Stainless steel has been incorporated in many curtain wall designs. As with any material used in building, costs vary depending on design requirements and solutions. Costs will be higher for elaborate, unique or complex detailing than for simplified, standardized designs. Thus, stainless curtain walls have ranged from quite costly to most economical. A study of these latter installations reveals points for consideration when an architect wants to obtain the quality of stainless steel in a competitively-priced curtain wall design.

TO HELP ACHIEVE ECONOMY IN STAINLESS

As early as possible in planning the structure, consult a stainless steel producer and a metal fabricator who has proved competent in handling the metal. They will be able to offer experienced advice on how to keep down costs. Their cost-cutting recommendations will probably include how to:

1. Design hollow sections in shapes which can be fabricated by common sheet metal techniques.

2. Reduce gauge. According to figures listed in the Metal Curtain Wall Manual published by the National Association of Architectural Metal Manufacturers, Type 302 stainless steel sheet has at least three times greater tensile strength than aluminum sheet. Architects can take advantage of this strength by reducing required gauges.

3. Design self-framing units to eliminate the need for structural steel back-up which adds weight and cost.

4. Where possible, incorporate commercial parts and details standardized by curtain wall fabricators. Custom detailing naturally costs more.

Though not affecting initial cost, other features of stainless steel should be considered when selecting curtain wall materials—beauty, durability through excellent corrosion resistance, and ease of maintenance. These advantages benefit the building owner as well as the architect, and explain the frequent selection of stainless steel in structures intended for long-term owner occupancy.

RECOMMENDED TYPES AND FINISHES

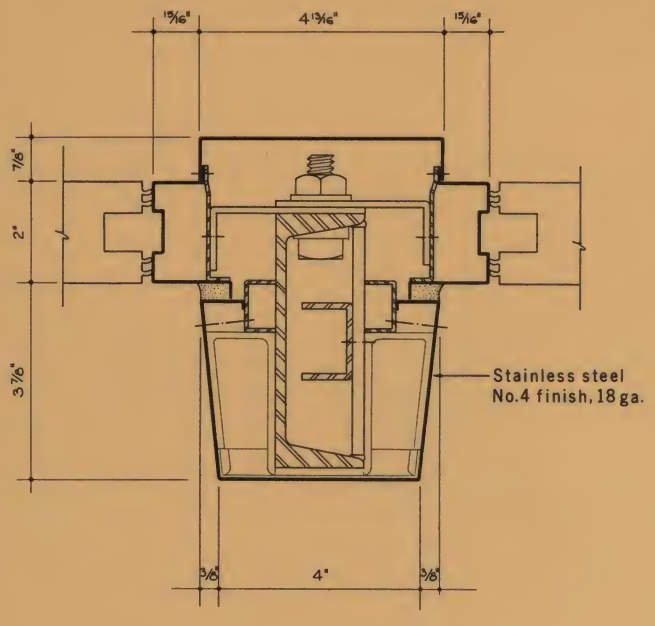
As is true in most exterior applications, Type 302 stainless steel is usually recommended for curtain walls with Type 202 an alternate. No. 4 finish is practically standard for mullions, while in cases where stainless steel is used for spandrel panels, a less reflective finish such as No. 2D is suggested.

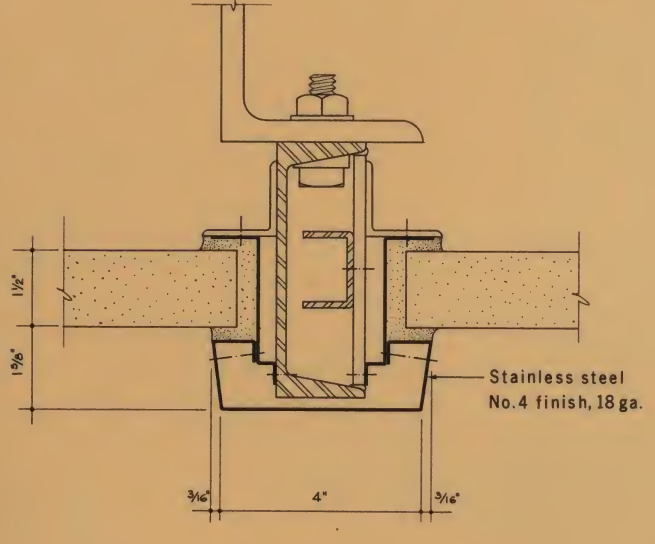
Fasteners for curtain wall systems employing stainless steel and other metals should be of stainless. They will out-perform all others.

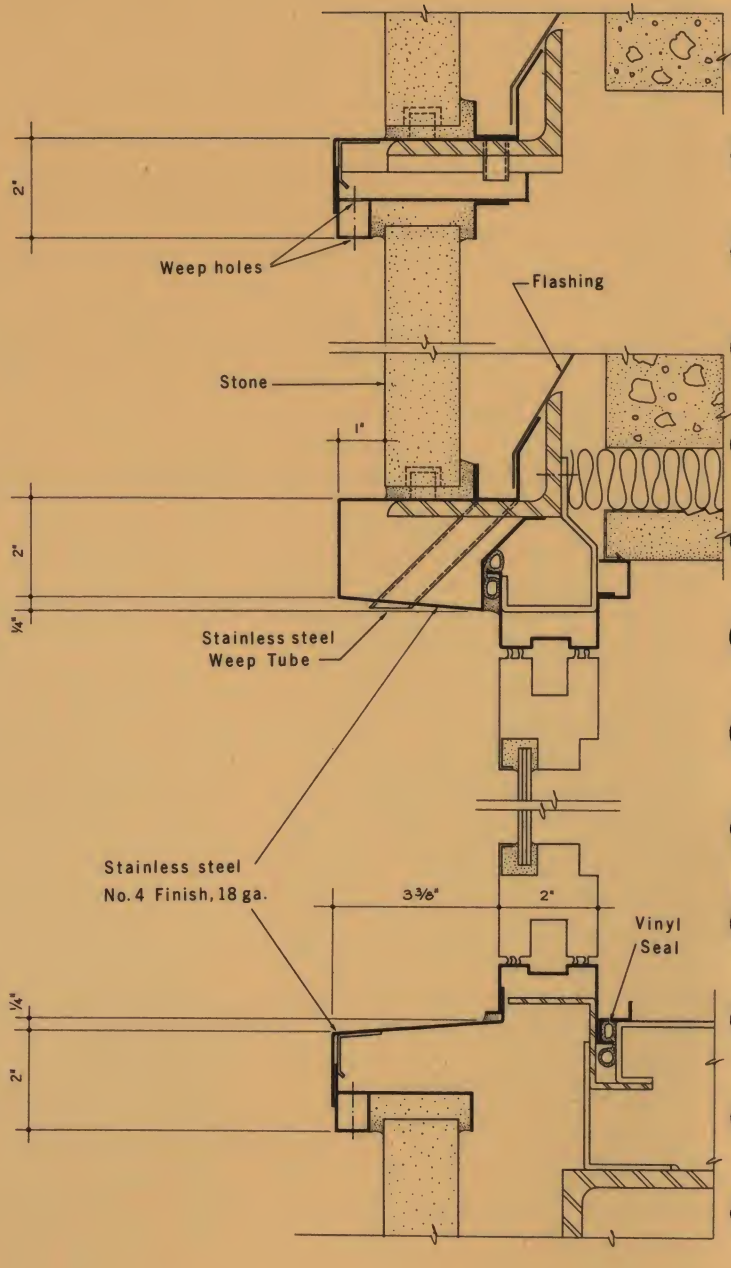
For aid in writing specifications, the *Metal Curtain Wall Manual* produced by the National Association of Architectural Metal Manufacturers is recommended.

In the following pages are five recent curtain wall jobs where stainless steel components were a major part of the system. These designs show what can be done. They offer varied but sound solutions, and may suggest ways of meeting future curtain wall needs.

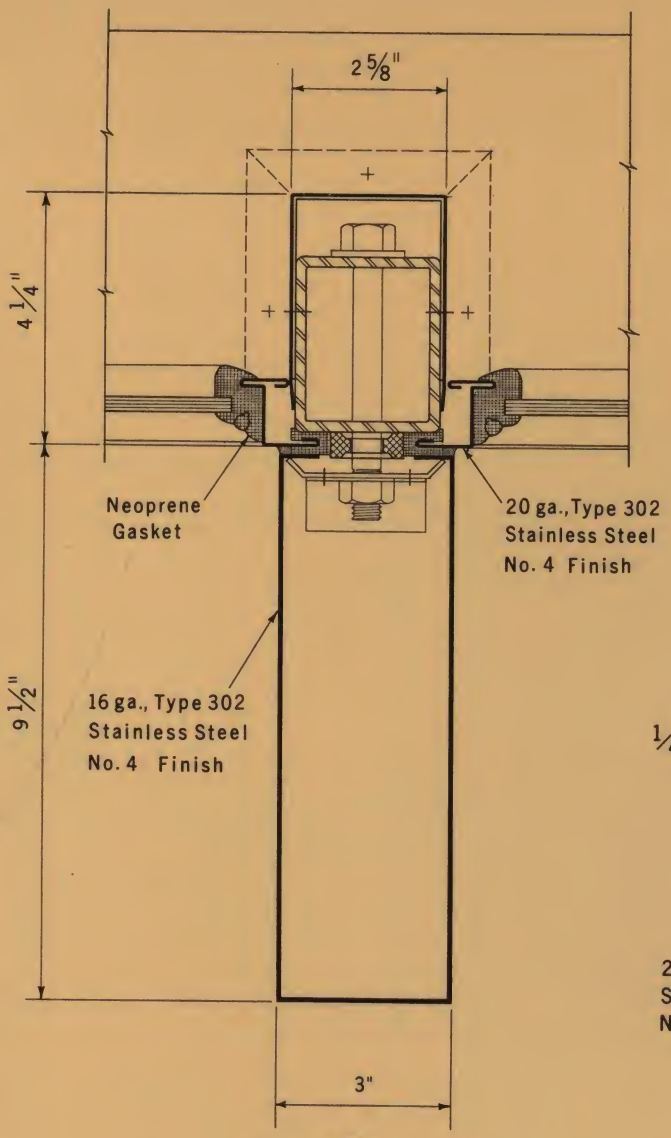
No. 4 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.

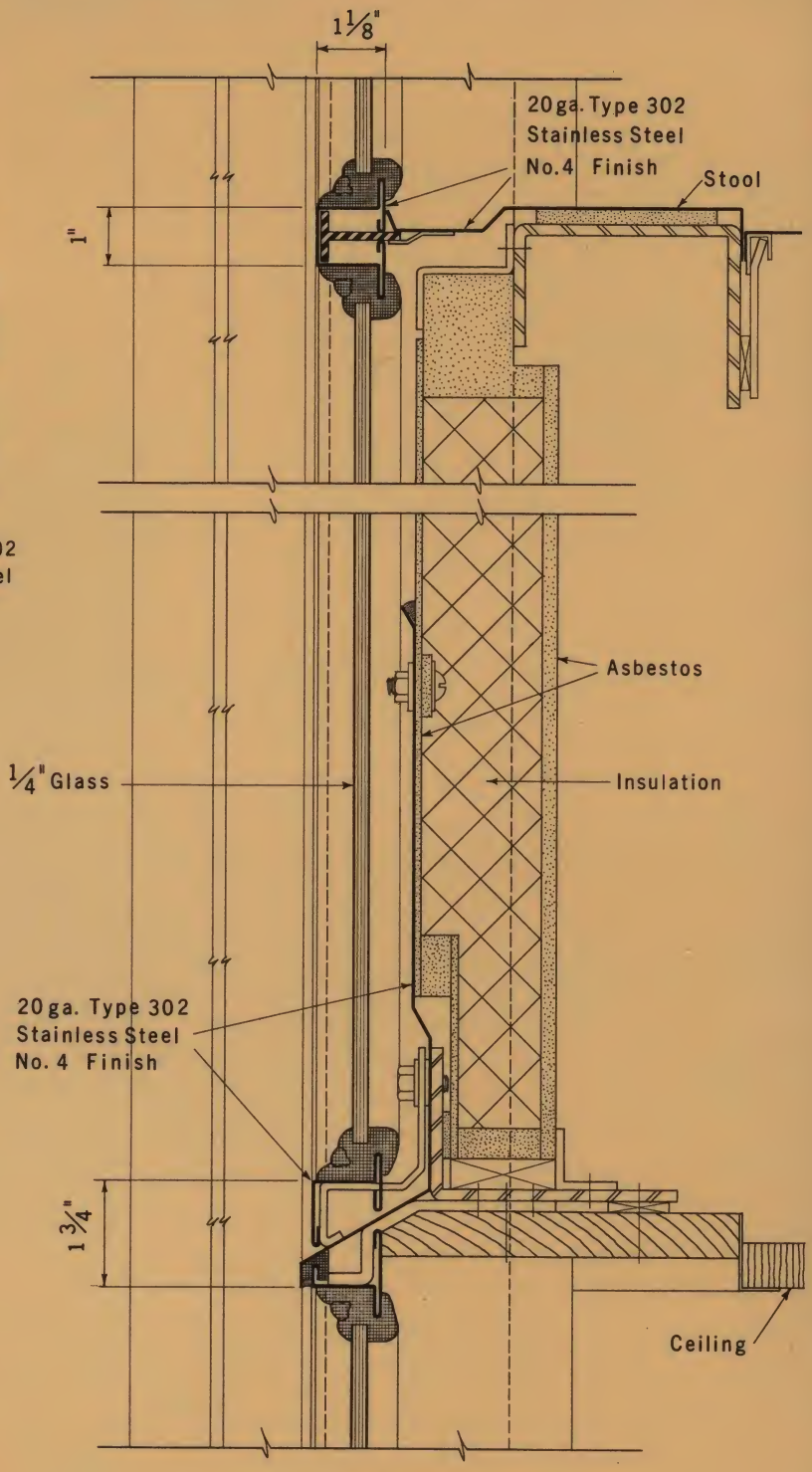




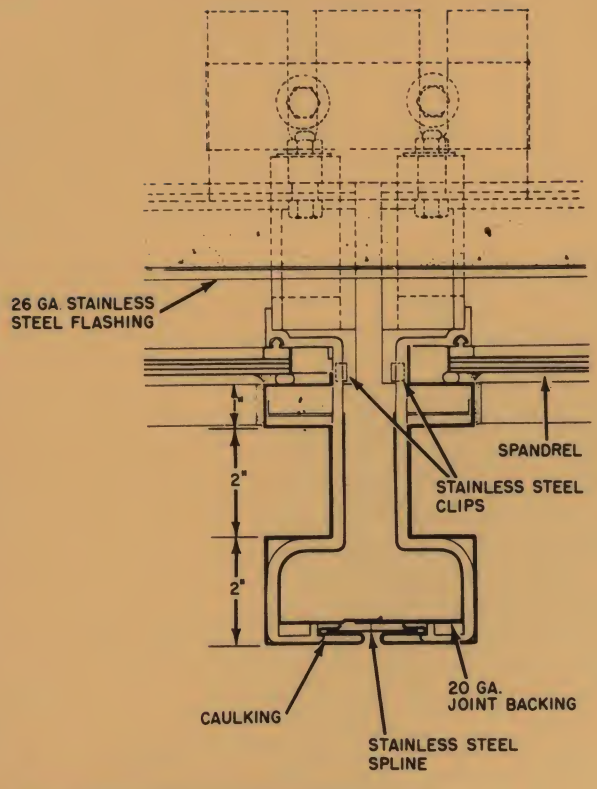


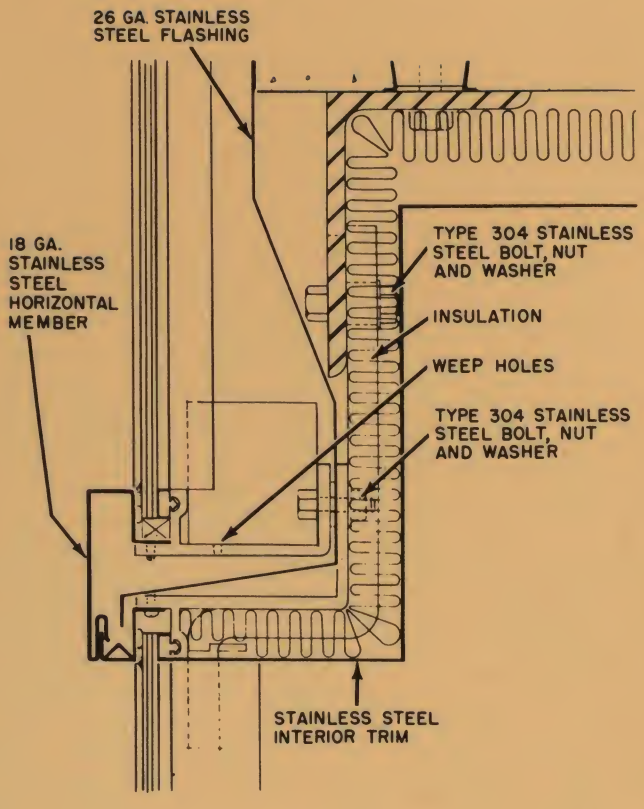
THE MUNICIPAL COURTS BUILDING in New York City features green granite spandrels held in place by metal studs at the head and a stainless bead at sill or muntin. Weep holes, weep tubes and vinyl seals guard against leaks. Mullions and reversible window frames are Type 202 stainless steel. William Lescaze and Mathew DelGaudio, associated architects. Fabricator: Trio Industries, Inc.



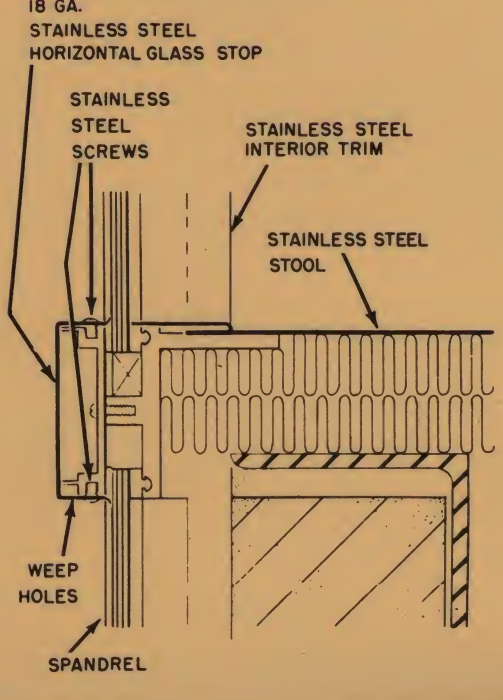


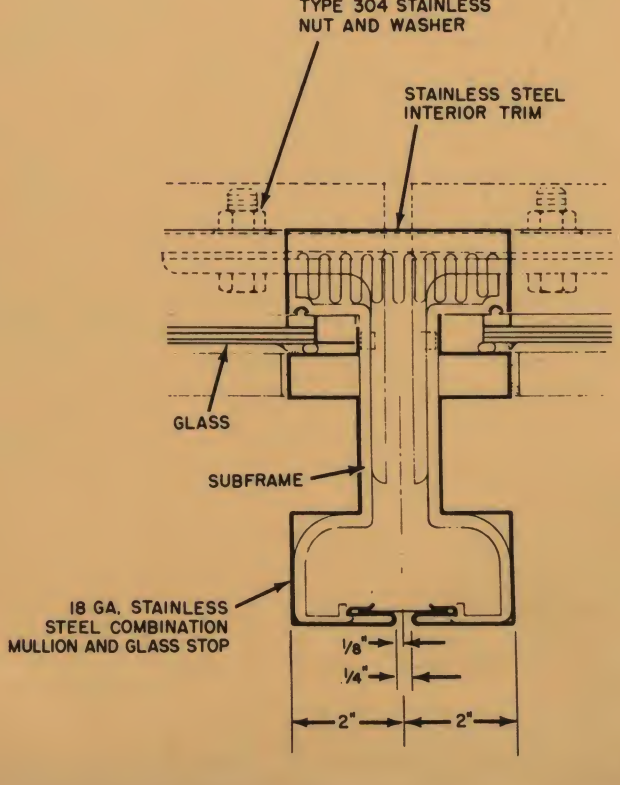
130 BLOOR STREET WEST, an investment office building in Toronto, Canada, was designed in stainless at a competitive price with other metals. Note selection of light gauge where feasible. Deep mullion is stiffened at intervals. Wide flashing becomes part of horizontal mullion at ceiling line. Architect: Bregman and Hamann. Fabricator: Canadian Crittall Metal Window Ltd.

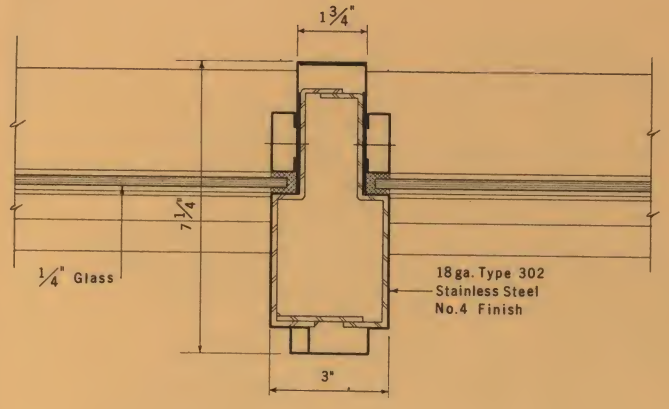


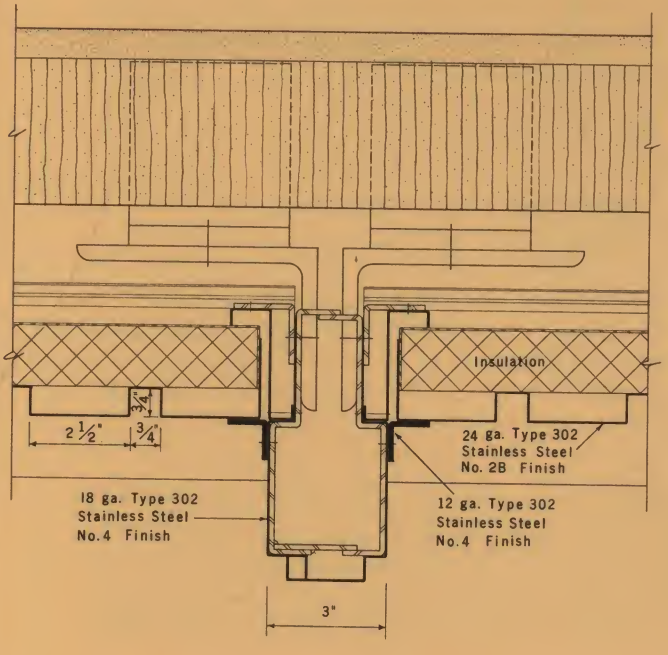


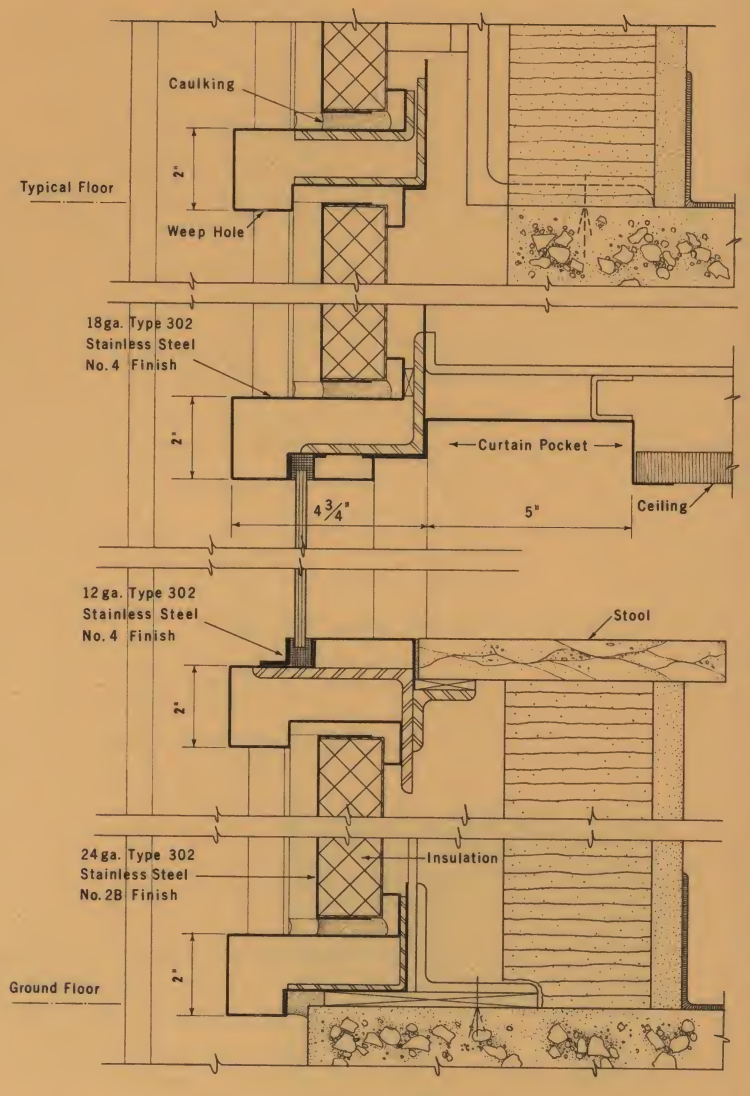
UNITED ENGINEERING CENTER in New York City has a basic curtain wall unit measuring 12½-ft. high and 5-ft. wide. Mullions are center-joined with an 18-gauge stainless spline to form an expansion joint. Weep holes, neoprene rope and gaskets, and polysulphide caulking guard against leaks at joints. Architects: Shreve, Lamb and Harmon Associates. Fabricator: Moynahan Bronze Company.





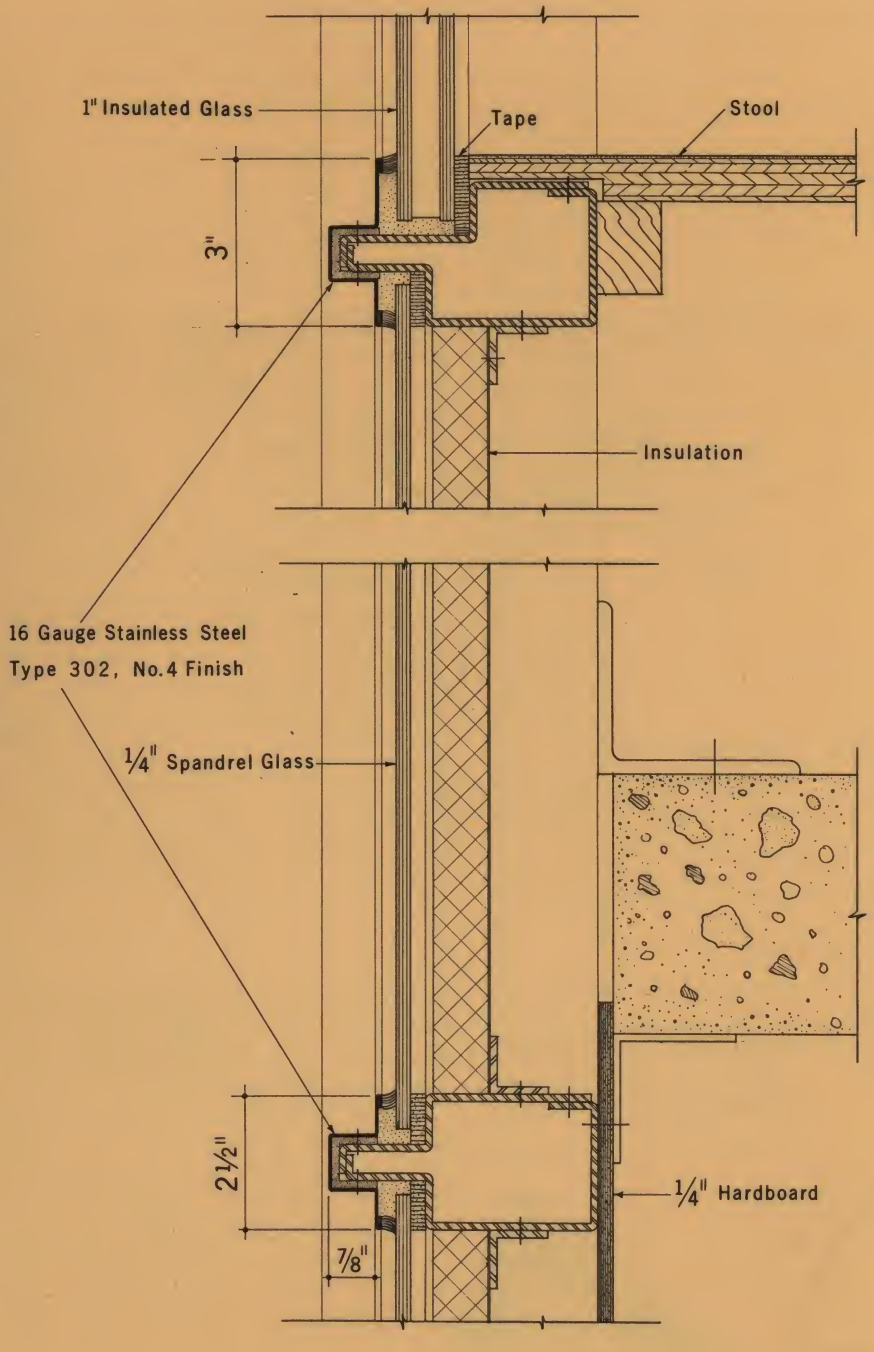


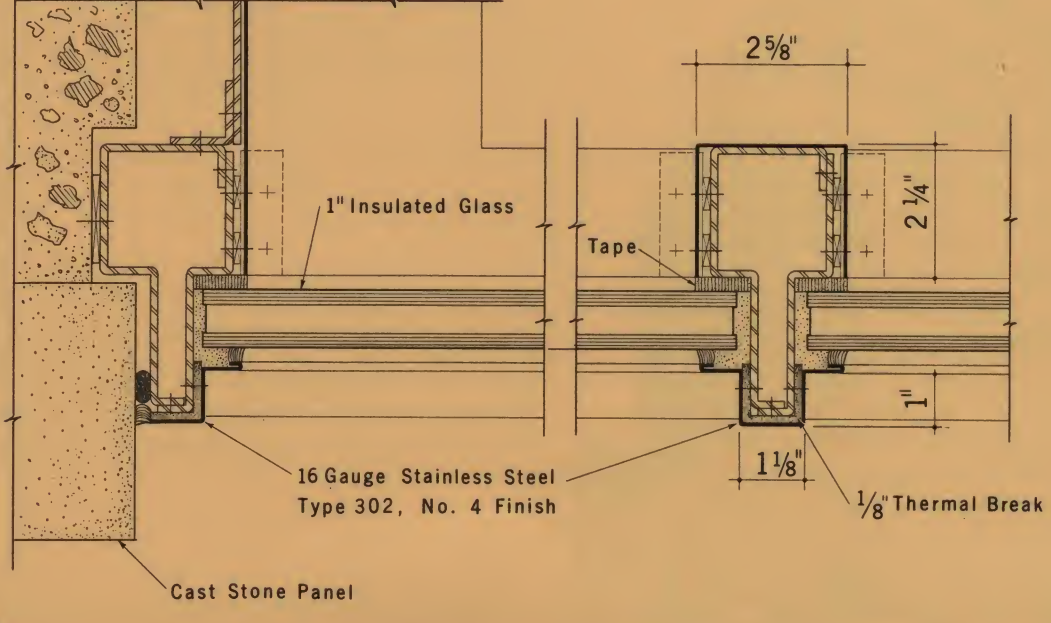




REPUBLIC AVIATION RESEARCH CENTER in Farmingdale, Long Island, employs light gauge stainless with a No. 2B finish for brake-formed spandrels. Insulation and pattern in panel provides stiffness. No. 4 finish highlights the mullion. Fixed window frames are also of stainless steel. Architect: Marr and Holman. Fabricator: Albro Metal Products Corporation.

THE ATLANTIC CEMENT COMPANY building in Ravena, New York, shows an extremely simple, thin-line framing system with a minimum of finished material required. Architect: Albert S. Hartheimer. Fabricator: Michaels Art Bronze Company.





Printed in U.S.A. 56217M

Stainless Steel

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 5

Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.

STAINLESS STEEL WINDOW FRAMES FOR COMMERCIAL AND INSTITUTIONAL BUILDINGS

Window frames of stainless steel, both fixed and pivoted, are on the increase in commercial and institutional buildings. Reason for this growth is twofold: the basic advantages of stainless, and the now competitive cost of stainless frames. Among the metal's advantages for this application are:

1. *Longevity.* Stainless outlasts other metals. Under normal conditions it has a nearly unlimited life-span. This eliminates need for replacement.

2. *Easy maintenance.* No need to paint or refinish stainless frames. Only cleaning generally needed is washing with detergent and water. On upper stories this can usually be left to the rain.

3. *Attractive appearance.* Stainless has a bright, clean look. It blends well and its color does not intrude on that of other materials. Its reflectivity complements and highlights.

4. *Corrosion-resistance.* There is no danger of corrosion products forming on stainless frames and staining adjacent materials, or of stainless windows corroding shut from lack of care.

COMPETITIVE COST FACTORS

Standard stainless steel window frames can be closely competitive in cost with those of other metals, although custom made frames of special design may cost more in stainless. The spread in cost between stainless and, for example, aluminum varies from one fabricator to another. The cost of a standard stainless framing section is generally within 10% of that for aluminum, while individual designs can be equal in cost to an aluminum design of equal strength.

There are three basic reasons for this favorable cost situation: the use of automated fabrication methods, the development of more economical designs in stainless, and the use of lighter gages and thinner sections to reflect the strength of stainless.

No. 5 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.

Most standard stainless windows are fabricated today by roll forming, a rapid and automated process which can economically turn out a large quantity of sections of complex design. It has come into increasing use in the recent past as the quantity of stainless windows specified has increased and the design of sections has improved. Although equipment can be costly to purchase and to re-tool, the completely automatic operation means savings in quantity production.

A more basic factor in the lower cost picture is the growing tendency of architects and specification writers to write performance-type specifications. Construction-type specs, which require stainless sections as thick as aluminum ones, or specify stainless extrusions, put an unnecessary cost disadvantage on the stronger stainless. Specs which incorporate the special advantages of stainless into the design, however, permit valuable cost savings.

CONSIDERATIONS FOR SPECIFYING

In preparing performance-type specs, the architect should consider:

1. *Using light gages.* Stainless has, in general, three times the strength of aluminum, and material for window frames can be as light as 21 gage.

2. *Using small sections.* These require minimum material and no stiffeners, and are simpler to fabricate than are larger sections.

3. *Using standard designs.* By specifying designs manufactured in quantity by a fabricator, the architect can take advantage of cost savings through mass fabrication.

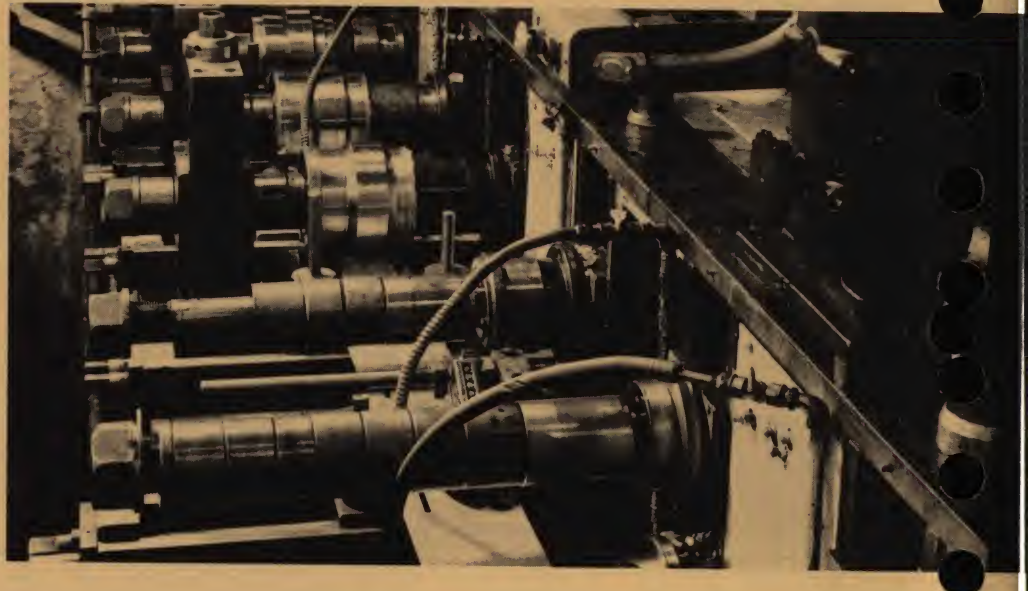
It is hoped that the designs in the following pages will help architects to take advantage of the cost-saving factors inherent in stainless steel.

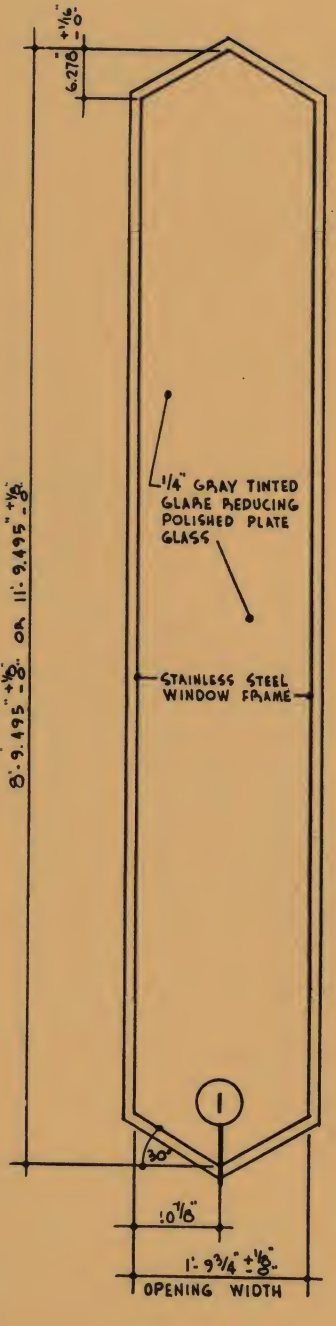
For the attractive new Michigan Consolidated Gas Company Building in Detroit (see photo, page 1), associated architects Minoru Yamasaki – Smith, Hinchman and Grylls specified stainless steel window frames. Despite their unusual hexagonal shape, they were fabricated by Adams and Westlake Co., Elkhart, Ind., at a price competitive with that of aluminum. This was achieved by:

1. Use of light weight 21-gage stainless and a small section, measuring only 2 inches by 1 5/32 inches.
2. Roll forming.
3. Special bending operation after roll forming that eliminated four welds in each frame.
4. Development of simplified on-site installation method.

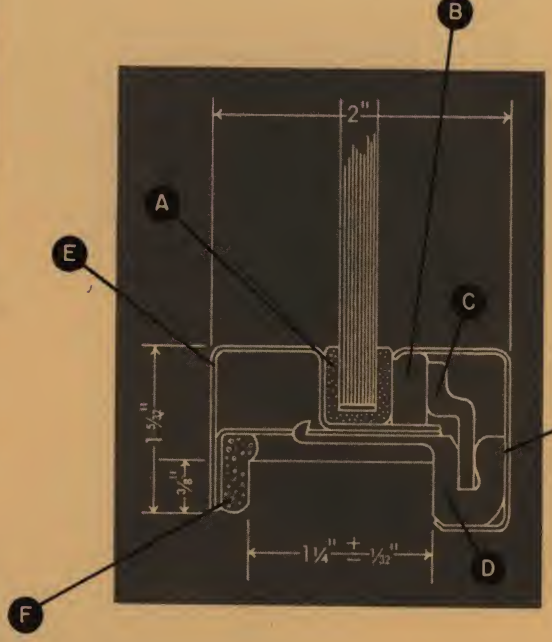
Although the hexagonal window was specially designed for this building, the same cross section design and installation method are used in the fabricator's Adlake 100 S window.

Fully automatic roll forming operation at plant of Van Huffel Tube Corp., typical of fabrication method used for most stainless window frames, turns out frame section for windows of Michigan Consolidated Gas Company Building. Stainless strip was pre-punched to receive installation clamps.





ELEVATION OF TYPICAL WINDOW
SCALE: 1/2" = 1'-0"



(A) Closed cell neoprene glazing channel. (B) Extruded metal bar. (C) Extruded metal glazing clip. (D) Extruded metal frame retaining clip. (E) .033-.035 stainless steel frame. (F) Closed cell sponge neoprene. (G) Inner trim .033-.035 stainless steel.

Simple on-site installation method, devised by fabricator Adams and Westlake, helped to reduce costs of Michigan Consolidated Gas Company Building's stainless window frames. Frames were made in two sections: the main or outer frame and the inner trim. Here the main frame, supported by a jig, is lifted into place.

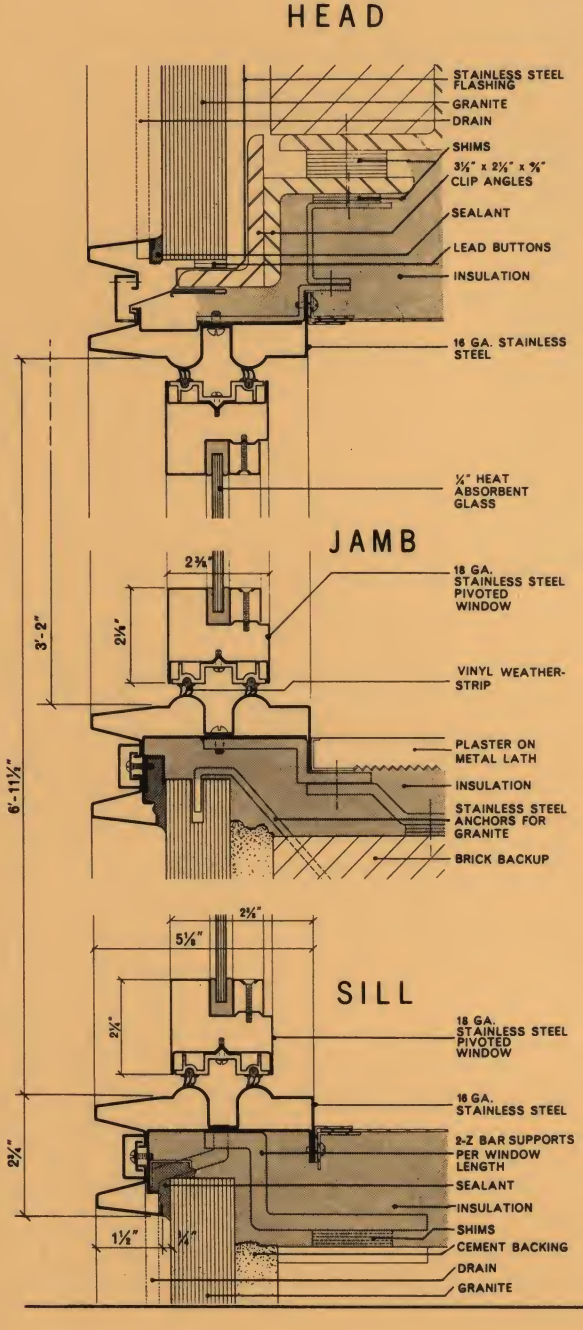
Gray-tinted glass is fitted into neoprene glazing channel in main frame.

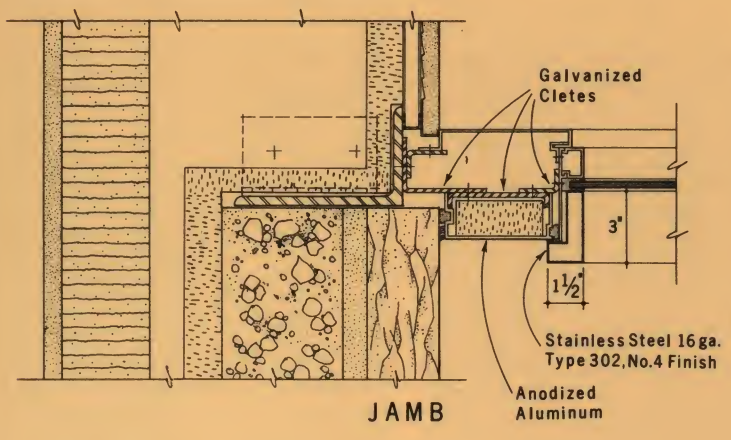
Extruded metal clip, installed by special hand tool, clamps frame against outer wall. Neoprene gasket, compressed between frame and masonry, acts as weather seal. Elements of this fastener-free installation method (patented by the fabricator) are adaptable to a variety of fixed window designs.

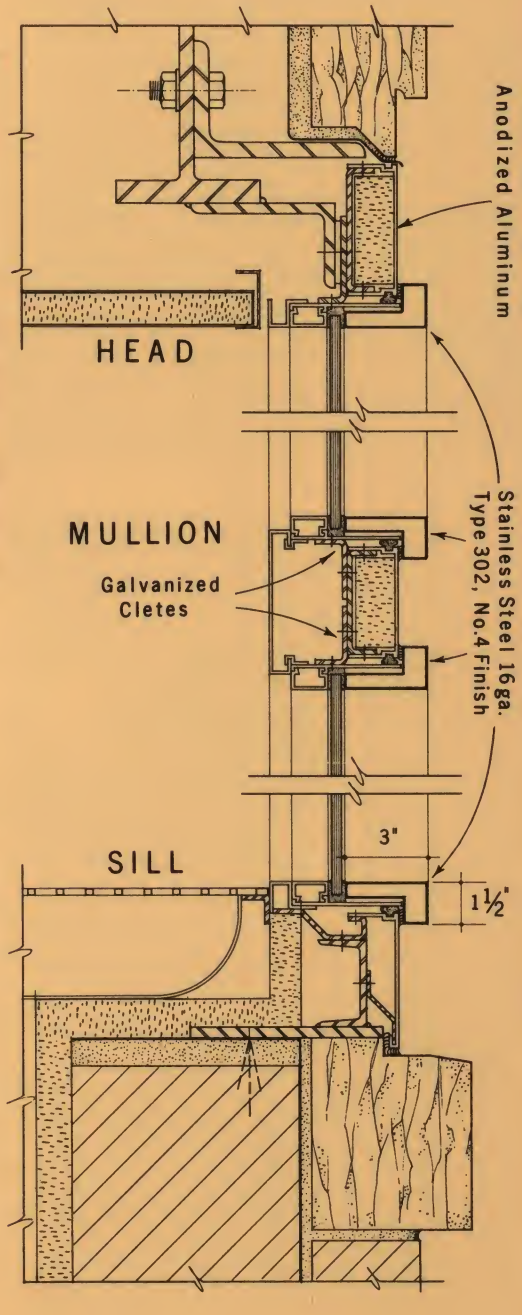
Inner trim, also roll formed of stainless steel, is pressure-fitted over the frame-retaining clips to complete the simple installation.

Fully reversible stainless steel windows, roll formed by General Bronze Corporation, simplify maintenance of C.I.T. Financial Corporation Building, New York. Stainless pivots, fitted into center of upper and lower frames, permit 360 degree rotation so that both sides of window can be washed from inside.

Architects: Harrison and Abramovitz.

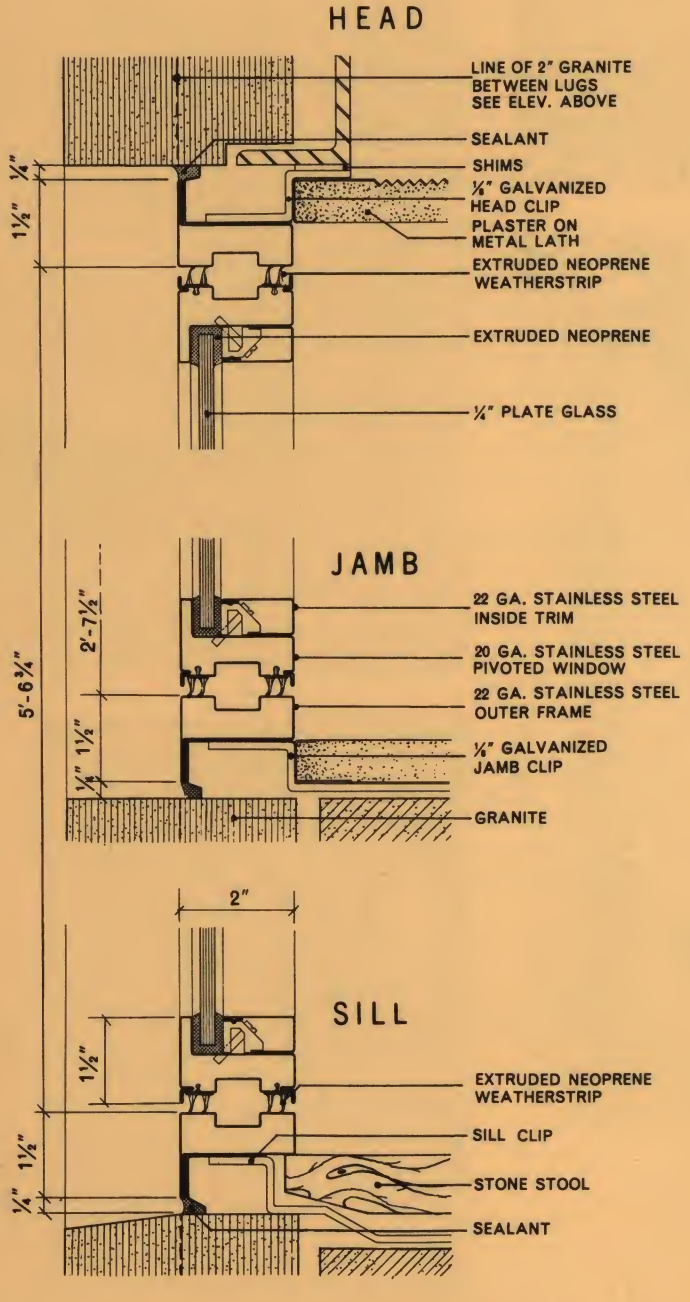






Fixed windows, inset in recesses at right angles to outer wall of Smithsonian Institution's new Museum of History and Technology in Washington, stretch from second floor terrace to roof. Frames consist of esthetic combination of bright stainless steel rimming gray anodized aluminum and were fabricated by Capitol Bronze Corporation. Opening in roof above window permits lowering of window washer's scaffold.

Architects: McKim, Mead and White.



Degree of Honor Insurance Building, St. Paul, Minn., has vertically pivoted stainless steel windows fabricated by Standard Products Company. Design shows efficient use of stainless' high strength. While 20-gage metal is used for framing of pivoted sash, both outer frame and inside trim are lighter weight 22-gage. Architects: Bergstedt, Hirsch, Walberg and Wold.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 6
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.

STAINLESS STEEL FINISHES

Although strength and corrosion-resistance are two qualities of stainless steel of great value to the architect, the metal is most frequently specified for applications where appearance matters. Stainless is a "good mixer" in that it can be used in combination with most traditional materials to enliven or tone down their appearance, to contrast or to blend with them. This flexibility can be achieved by the architect through careful selection of finishes.

These finishes are not applied to lengthen the life of the metal nor to improve its service. The corrosion resistance of stainless steel is a quality inherent in its composition. Consequently, the function of the finishes on stainless steel is purely esthetic.

BASIC MILL FINISHES

There are eight basic mill finishes for sheet available from most stainless producers. These are numbered for convenience from 1 to 8, and run from a dull matte gray to a high mirror polish.

Of these, three are most commonly used in architecture:

NO. 2D, a dull, cold-rolled finish with a clean but non-reflective appearance. Since its uniform color gives off minimum reflected light, it is most highly recommended for broad, flat applications, such as spandrel panels or siding.

NO. 2B, a bright, cold-rolled finish that has a matte-like appearance when viewed closely, but is relatively reflective. It is an excellent finish for detail, mullions, fascia, trim and the like, where lustrous depth is desirable.

Textured stainless steel, color coated with a black organic substance, forms spandrels that combine the permanence of stainless with a rich color tone in Union Carbide Building, New York. Mullions are stainless steel with bright No. 4 finish for accent.

Architects: Skidmore, Owings and Merrill

NO. 4, a brilliant, machine polish with sparkling abrasive lines. This is an excellent finish for "dress-up" effect in building entrances, marquees, elevator doors, column covers, and food service equipment. No. 4 finish is also recommended where there are visible welds, since subsequent hand-polishing with abrasive materials will blend welds into the "brush-marks" of the finish.

Finishes brighter than No. 4 find limited use in architecture, since they can distract with overly bright reflections. A full tabulation of mill finishes will be found on page 2.

OTHER FINISHES

The mill sheet finishes described above are applied only to stainless steel sheet — material in coils or cut lengths 24 inches or over in width. For stainless strip—material less than 24 inches in width — there are two mill finishes: No. 1, approximating sheet finish No. 2D in appearance, and No. 2, approximating No. 2B sheet finish.

In addition to the basic mill finishes, there is a wide variety of proprietary finishes available from individual producers. These include one which combines a matte-like appearance with sufficient sparkle to recommend it for decorative applications; a cold-rolled finish with brush marks simulating those of No. 4 finish; and a bright annealed surface, obtained by annealing in a controlled atmosphere, possessing considerably more reflectivity than cold-rolled finishes. Full information on proprietary finishes can be obtained from companies that produce stainless steel.

Sheet Finish Designations

Unpolished Finish **No. 1**	A dull finish produced by hot rolling to the specified thickness, followed by annealing and descaling.
Unpolished Finish **No. 2D***	A dull finish produced by cold rolling to the specified thickness, followed by annealing and descaling. May also be accomplished by a final light roll pass on dull rolls.
Unpolished Finish **No. 2B***	A bright finish commonly produced in the same way as No. 2D finish except that the annealed and descaled sheet receives a final light cold roll pass on polished rolls. This is a general purpose cold rolled finish, and is more readily polished than the No. 1 or No. 2D finishes.
Polished Finish **No. 3**	An intermediate polished finish generally used where a semi-polished surface is required for subsequent finishing operations following fabrication.
Polished Finish **No. 4**	A general purpose bright polished finish obtained with a 120-150 mesh abrasive, following initial grinding with coarser abrasives.
Polished Finish **No. 6**	A soft satin finish having lower reflectivity than No. 4 finish. It is produced by Tampico brushing the No. 4 finish in a medium of abrasive and oil.
Polished Finish **No. 7**	A highly reflective finish produced by buffing a surface which has first been finely ground with abrasives, but "grit" lines are not removed.
Polished Finish **No. 8**	The most reflective finish commonly produced. It is obtained by polishing with successively finer abrasives, then buffing extensively with a very fine buffing compound to remove essentially all "grit" lines.

*No. 1 and No. 2 finishes for strip (widths under 24") approximate No. 2D and 2B sheet finishes respectively, in the corresponding alloy types.

Note: A wide selection of special finishes, too numerous to describe here, are available from mills & fabricators. Some of these finishes are variations of the sheet finishes described above. Consult your stainless steel fabricator.

COLORS AND TEXTURES

Other surfaces available on stainless steel are color coated, textured, coated and textured, and highlighted.

Color-coated stainless is produced by applying a porcelain enamel or an organic coating to stainless steel. Although porcelain enamel seems to provide the most durable coating, organic coatings are elastic enough to permit working the metal after coating. Coated stainless combines the high strength of stainless with the appearance of the coating, and has the added advantage that the coating performs better because the base metal will not corrode at the edges or where the coating is scratched, causing the coating to peel.

Textured stainless steel is available from several fabricators in a number of different patterns, obtained by deforming a sheet of metal between matched rolls. Patterns range from flutes, ribs and beads to non-directional patterns, both regular and irregular, and in varied sizes and depths. Textured stainless has a bright but non-reflective surface suited for broad areas of facing and a rigidity that permits the use of lighter gages than would be required in non-textured material. In heavy-traffic areas, the texture will hide scratches or nicks.

Coated and textured stainless, generally produced by texturing material to which an organic coating has been applied, has all the above advantages together with tonal variations of pat-

No. 2D finish gives a metallic luster to mullions and spandrels of the Gateway Center Buildings in Pittsburgh, but its matte surface is free of glare.

Architects: Eggers and Higgins

terns and the greater rigidity that comes from texturing.

Highlighted stainless, produced by polishing the raised portions of a textured sheet, has brilliance and depth of tone without large reflecting areas. In one form of this process, the depressed areas of the pattern have a relatively dull finish, such as No. 2D, while the raised portions have a No. 4 finish. In another version, the process is applied to a color-coated sheet, resulting in a combination of color with metallic brilliance.

AVOIDING OPTICAL DISTORTION

When using stainless steel over large areas, as with other metals, care should be taken to avoid optical distortion. This "oil canning" results from expansion and contraction of any metal during thermal changes, and is common to all reflective materials. Among the methods recommended for the control of this distortion are the following:

• Use slightly concave panels; these will give the wall a fluted effect and will eliminate all flat reflective surfaces.

• Back light gage sheet with a stiffer material. There are successful instances in which stainless has been fastened to composition board with epoxy cement.

• Use a panel with a shallow, die-pressed design.

• Break up the reflective surface by using textured stainless steel.

• Specify a heavier gage, so there will be no danger of buckling.

◀ Spire and tower sheathing of New York's Chrysler Building, shown here during cleaning, is permanent stainless steel. Bright No. 4 finish gives the tower an attractive gleam.

Architect: William Van Alen

▲ No. 4 finish, especially suitable for dressing up interiors, gives permanent gleam to escalators in New York's Pan Am Building lobby.

Architects: Emery Roth and Sons

Textured and highlighted stainless steel panels form spandrels on Toronto-Dominion Bank Building, Montreal. Black coating is heightened in tone by No. 4 finish on raised portions of design. ▶

Architects: Ross, Fish, Duschenes and Barrett

▲ Lattice-like truss wall of I.B.M. Building, Pittsburgh, is sheathed in textured stainless steel. Photo shows a mock-up of wall made prior to construction.

Architects: Curtis and Davis

No. 6 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 7 (1964)
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.

STAINLESS STEEL STAIRS

A staircase is designed not only to bear weight and resist the effects of heavy traffic; it often stands out as an independent design element. Consequently the architect must consider decorative as well as functional properties when specifying materials for stairs and railings.

ADVANTAGES OF STAINLESS STEEL

Stainless steel is ideal for such demanding applications because it offers the architect a combination of advantages unmatched by any other structural material:

• *Attractive appearance.* Stainless adds a clean and pleasing note to any design; yet its neutral color reflects and complements surrounding materials.

• *Resistance to abrasion.* Stainless' hard surface provides protection against nicks, scratches and general wear of heavy traffic. No painting, lacquering, polishing or re-finishing is required.

• *Corrosion resistance.* Virtually impervious to corrosion under usual urban and industrial conditions, stainless is particularly suited for outdoor stairs and ramps.

• *High strength.* Use of stainless steel permits designs with a slender section, and allows appearance of weightlessness combined with great actual strength. Stainless has three times the strength of aluminum, for example, and even greater rigidity when formed.

• *Competitive cost.* It is often surprising how closely the first cost of a structure made from stainless steel approximates that of one made from other materials, when the design incorporates the full potential of stainless.

• *Variety of mill forms.* The architect has a broad creative scope when designing in stainless, because of the variety of forms in which it is available. The following pages illustrate stairs making use of one or more of these mill forms.

No. 7 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee. Permission is granted to reproduce any of this material.

AVAILABLE MILL FORMS

Whatever the functional and esthetic requirements facing the architect in a staircase design, there is a stainless steel mill form to serve his purpose:

1. *Bars.* These are available in diameters of ¼ inch and over. Cross-sections can be round, square, hexagonal, octagonal, and many other shapes. Flats, or bars with rectangular section, are available ⅛ inch and over in thickness, and ¼ inch and over in width.

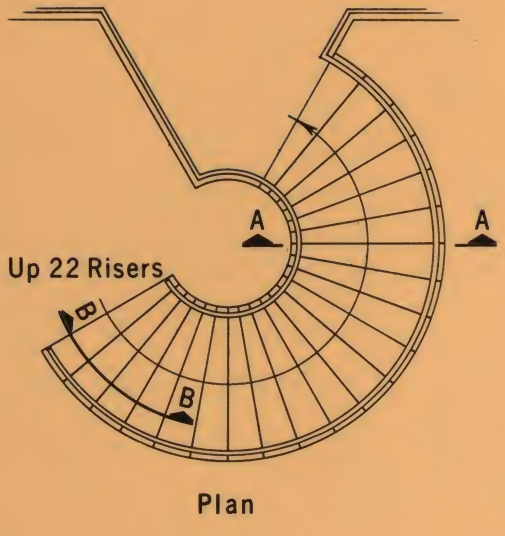
2. *Sheet and strip.* Available in thicknesses from 32 gage (0.0106 inch) to 10 gage (0.1406 inch), these forms can be roll or brake-formed into complex shapes with high strength. The term "strip" designates material less than 24 inches in width.

3. *Plate.* This mill form is available in thicknesses over 3/16 inch and in widths over 10 inches.

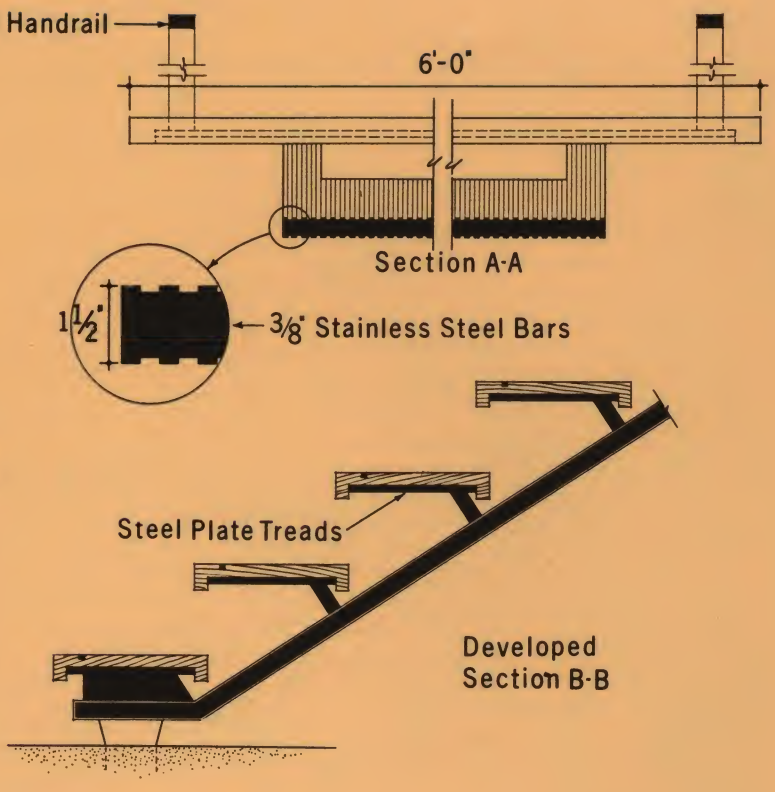
4. *Tubing.* Stainless tubing is available in circular, square and oblong sections, with wall thickness from 0.002 to 0.625 inch and in diameters from ⅛ inch to 40 inches.

5. *Extrusions.* This form, provided by several producers in a variety of standardized and special shapes, gives the architect wide flexibility in meeting specific engineering and esthetic requirements. Extrusions, used in conjunction with roll-formed shapes, expand the architect's horizons even farther.

Each of the five stairs illustrated in the following pages had specific design requirements that could be best met by a different mill form of stainless steel. And in each case, the ready availability of the form required made the design practicable.

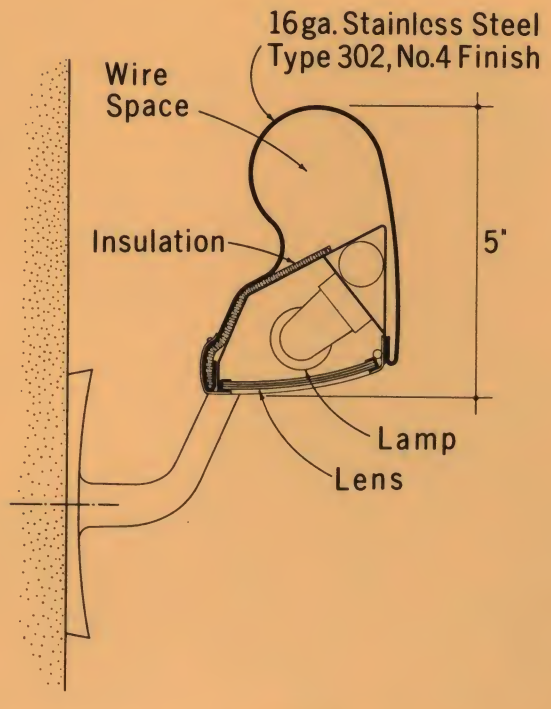


Plan



Use of stainless steel bars in laminated assembly makes possible the unique design of this free-standing constant-rise helicoidal staircase in the Canadian Imperial Bank of Commerce, Montreal. The thin support member shaped like a warped plane, called for in the design, would have been prohibitively difficult to fabricate in a single piece. In fabrication, mild steel temporary stringers in the required curvature acted as templates against which the first stainless bar was formed. Each bar then acted as a template for the next, until the whole assembly was completed. A total of 128 bars, each with a different curvature, form the assembly, and all are joined together with stainless steel dowels.

Architects: Clifford and Lawrie
Consulting Structural Engineers:
M. S. Yolles and Associates
Fabricator: A. Faustin Co. Ltd.

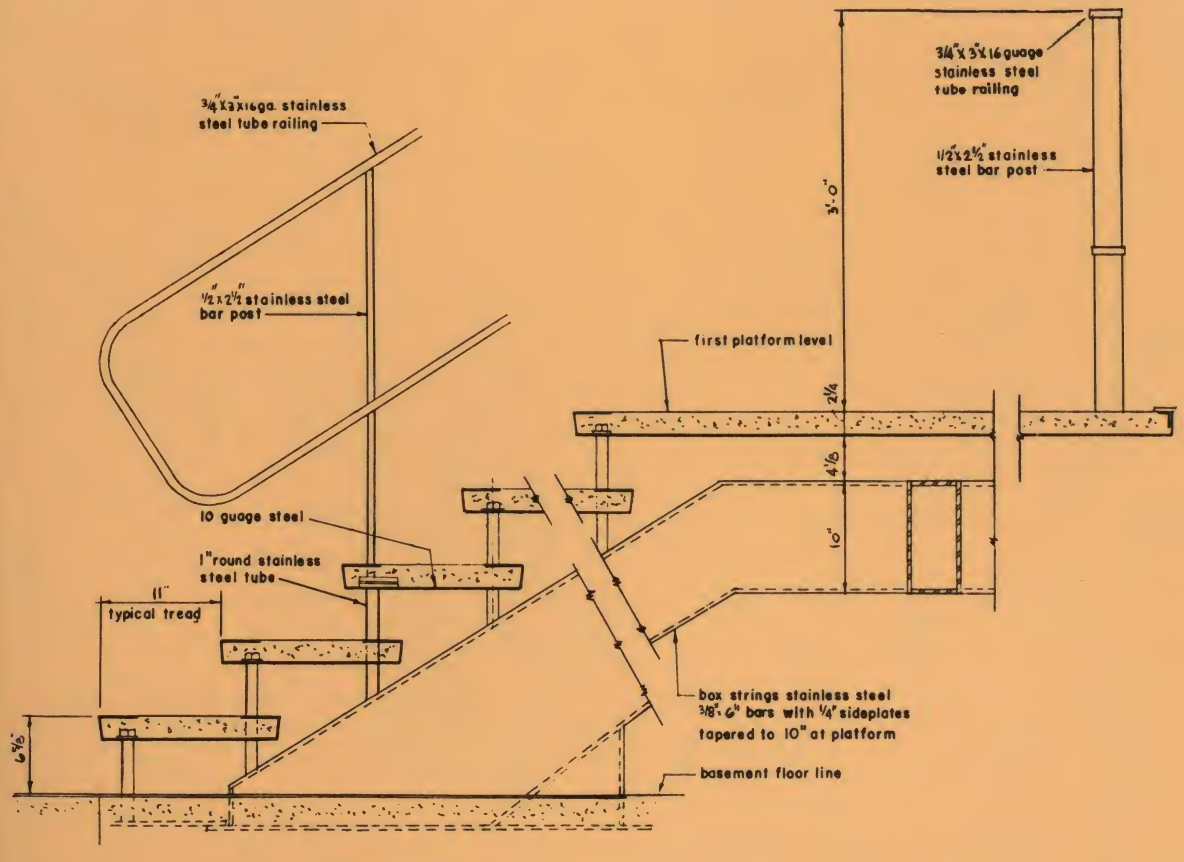


Stainless steel sheet, formed into an inverted U-shape (see drawing above), serves a two-fold purpose in this staircase at the Smithsonian Institution's Museum of History and Technology, Washington, D. C. It functions both as a handrail and as a protective fixture enclosing concealed electric lamps, which light the treads at night. Formed from 16 gage, Type 302 sheet, the rail is affixed to marble balustrade of staircase leading to second floor terrace.

Architects: McKim, Mead and White

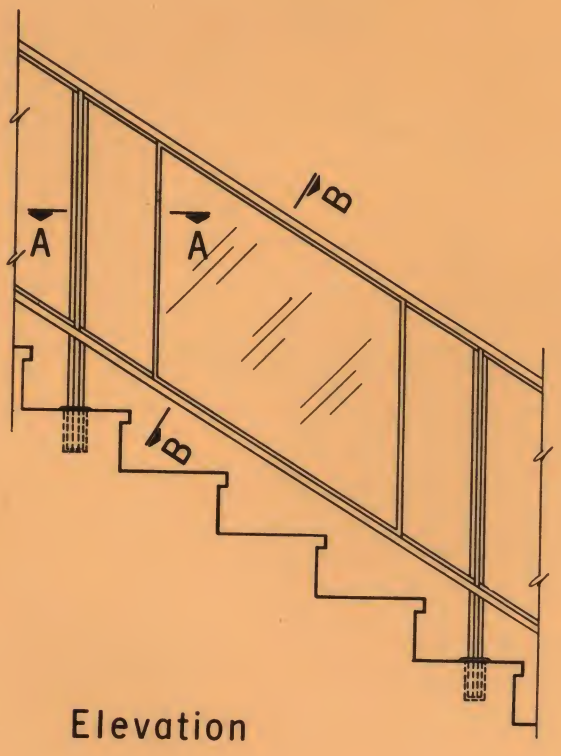
Fabricator:

Alexander Metal Products Corp.

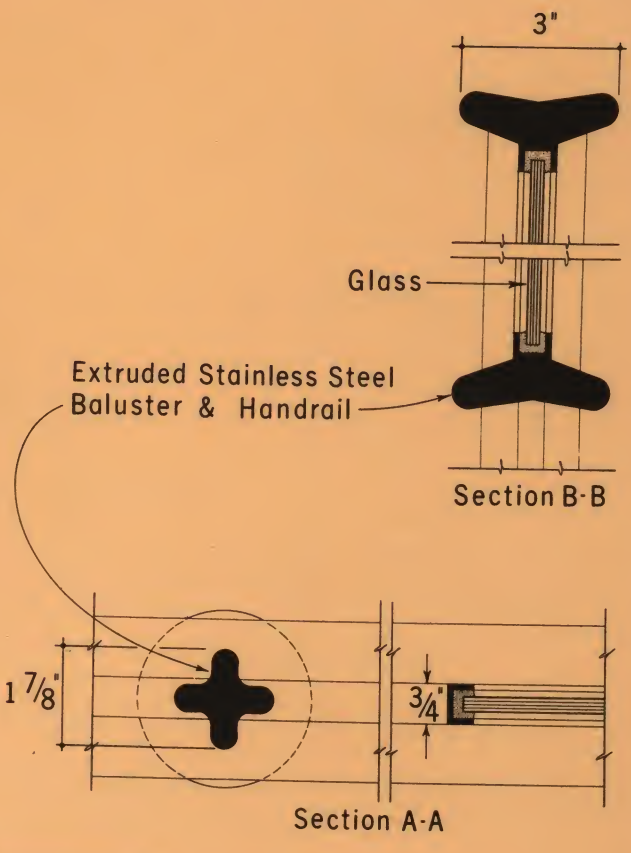


Rectangular stainless steel tubing was utilized in this staircase in United Engineering Center, New York, because the design called for rails and posts of rectangular cross-section with a sharper angle than could be provided by roll or brake-forming. Rectangular tubing was chosen over bar stock because of its lighter weight. Tubing of the sizes used — ½ by 2½ inches in the posts, ¾ by 3 inches in the rails — were available in standard stock sizes. Stainless steel was also used for box stringers, which are composed of stainless bars and ¼ inch stainless sideplates.

Architects: Shreve, Lamb and Harmon
Fabricator: General Bronze Corp.



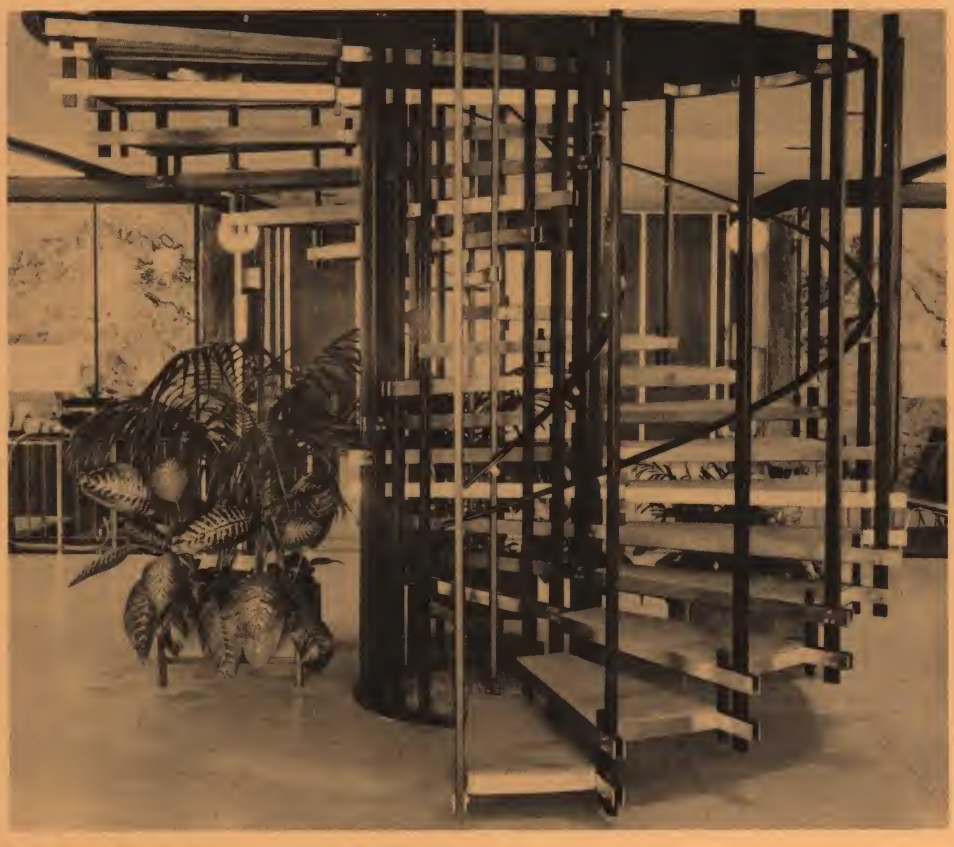
Elevation



Extruded stainless steel hand rails in the form of a spread-winged V, and balusters in the shape of a cross with rounded ends, were formed more economically than by other methods. These rails, with clear glass panels set between upper and lower rails, grace several short flights of stairs in the remodeled Fifth Avenue-34th Street office of the Bowery Savings Bank in New York.

Designed by Architectural Department,
Gibbs and Hill, Inc.
Consulting Engineers

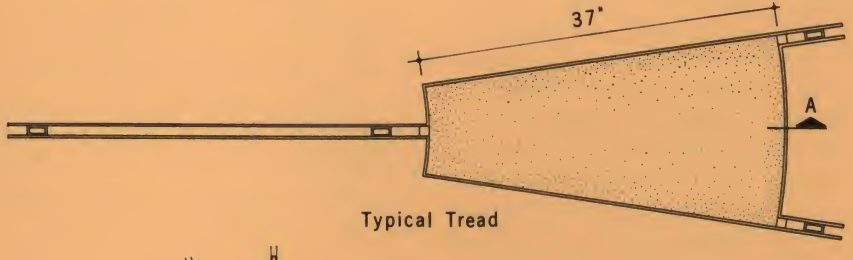
Fabricator: Trio Industries, Inc.



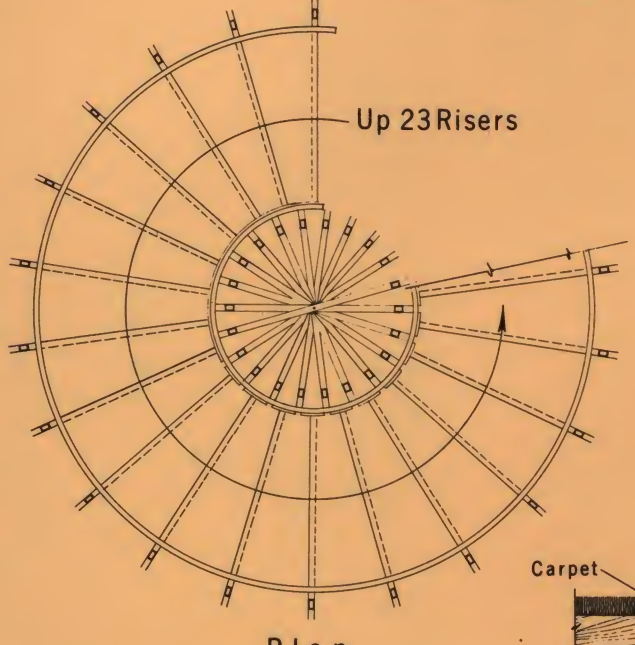
Stainless steel flats, ¼ inch thick, frame treads of this unique circular staircase and hold them to vertical supports, which are suspended from above. Flats were chosen because of their slender, trim appearance and to take advantage of the high load-bearing properties which the 2¼ inch vertical sections possess. Staircase joins banking floor with second floor offices of First Liberty National Bank, Liberty, Texas.

Architects: Jenkins and Hoff

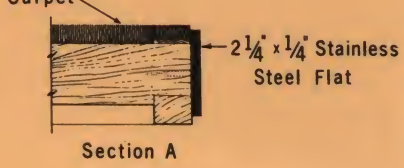
Fabricator: Carter Welding Co.



Typical Tread



Plan



Section A

Printed in U.S.A.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 8
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York 17, N. Y.
(1964)

STAINLESS STEEL FLASHING

Stainless steel made its debut as a material for flashing in 1929 when it was used for exposed cap and base flashing in the tower of New York's Chrysler Building. More than thirty years later, an American Society for Testing and Materials committee reported that after this long exposure to the corrosive atmosphere of the city, the stainless steel remained virtually unattacked under the film of dirt deposited over the three decades. On removal of the film, the stainless appeared as bright as when first installed.

This is an outstanding illustration of the permanence and serviceability of stainless steel as a material for flashing, and an indication of why stainless is so widely used today for flashing even in buildings where other metals predominate. To fully appreciate stainless steel's advantages, one need only consider how well it meets all the requirements of a good flashing material.

The purpose of flashing is to prevent moisture from seeping into a building's structural members and its interior, where it may cause deterioration and eventual damage. At the same time, protection is not needed behind all parts of the facing; generally flashing is only applied at critical points where penetration of moisture is likely. Such critical points include the base of walls and columns — where foundations must be protected from surface moisture — the head and sill of windows, copings and parapets, and areas on a roof where wells are sunk below, or vents and skylights protrude above, roof level.

REQUIREMENTS OF FLASHING

All these instances call for a flashing material that is waterproof, permanent, non-corrosive (either by action of moisture or alkalis in masonry), non-staining (particularly when a light-colored facing is used), and strong enough to withstand the shifting of materials. Stainless steel meets all these requirements perfectly:

• Stainless is the most permanent of materials, as the Chrysler Building installation has proven. Its resistance to corrosion is inherent in its composition;

there is no protective coating to wear or chip off.

• Stainless will not corrode under usual urban or industrial conditions, and under extreme conditions, where the metal is subject to chemical fumes or ocean spray, the commonly used Types 302 or 304 can be replaced with the more highly corrosion resistant Type 316.

• As a corollary to this, the corrosive action of alkalis has little or no effect on stainless, and it can therefore be used in contact with brick, stone and mortar. It is the most compatible metal available for use with other building metals, even in the presence of an electrolyte.

• Being so resistant to corrosion, stainless will not form corrosion products which could seep out and stain the facing.

• High tensile strength and modulus of elasticity of stainless, and a relatively low coefficient of expansion, help it to withstand the shifting of materials, even when used in gages considerably thinner than those commonly specified in nonferrous metals.

• Stainless steel flashing can be made in a variety of shapes, since it can be formed by all standard metalworking methods, including brake and roll-forming. It can be soldered, welded or brazed. Where concealed flashing has no load-bearing requirements, on-the-job soldering helps to speed up an installation.

LIGHT GAGES PERMITTED

In most through-wall and concealed flashing applications, thin gages of stainless steel are most satisfactory. Thirty gage (0.012 inch) is considered standard, and exposed flashing requires only slightly heavier material—26 gage (0.018).

A ribbed stainless flashing has appeared on the market recently. The manufacturer claims that the pattern gives the material extra rigidity, and that even lighter gages can be used. Sheets of 0.008 inch thickness are said to have the rigidity of flat material of 0.010 or 0.012 inch. The ribs or grooves, about half-an-inch apart, are said to provide a better mechanical bond in mortar joints and to induce drainage of moisture from any point.

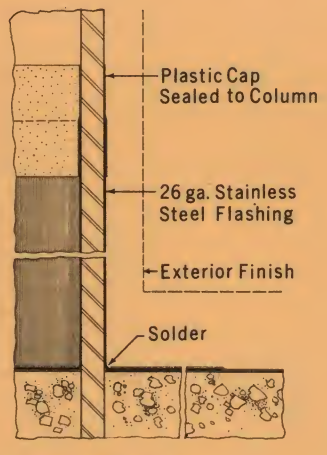
Since appearance is not a factor in concealed flashing, standard 2D mill finish is satisfactory. For exposed flashing, a brighter finish may be used, either 2B mill finish or polished No. 4 finish.

When installing stainless steel flashing, continuous strips for base and cap flashing are generally made up from eight-foot sheets, joined by one-inch locked and soldered seams into larger units. These latter can then be joined together at the site by expansion joints filled with an elastic caulking compound. In some cases, on-the-job soldering has eliminated all mechanical joints and greatly expedited installation.

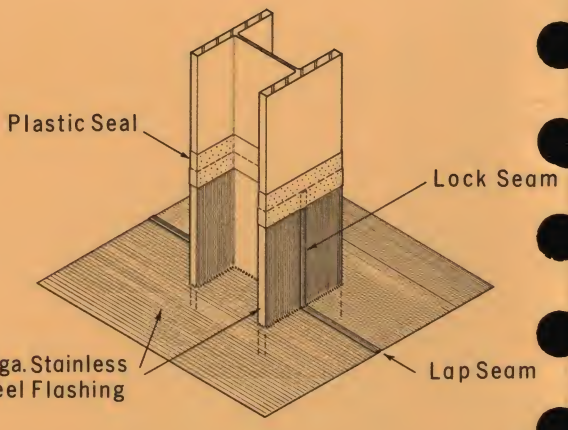
Upper edges of flashing are held in place either by stainless steel nails or by inserting into stainless steel reglets and securing with lead plugs. Reglets are then filled with elastic caulking compound.

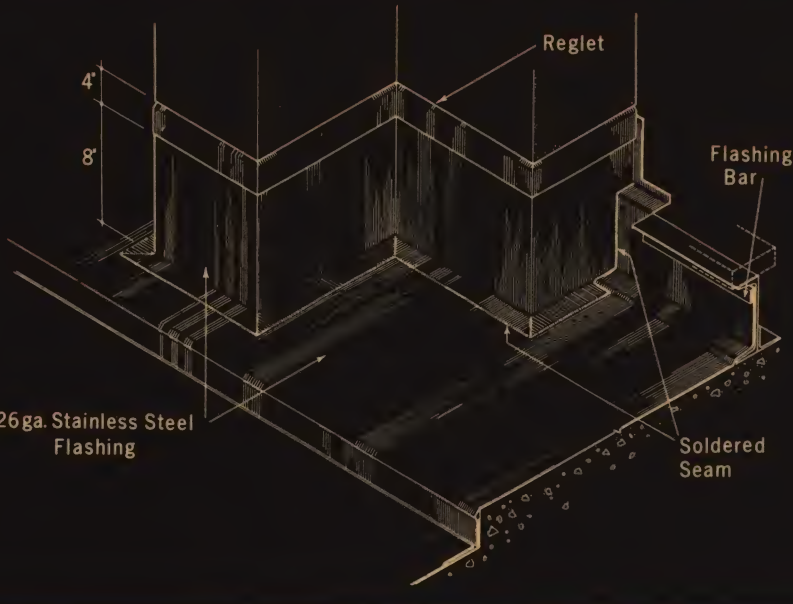
The base of columns and walls is one critical point where moisture, seeping down behind the facing, could enter a building's foundation. Flashing at such a point generally extends below grade in order to lead moisture away from the foundation and into the soil. Relatively simple installation (right) on New York Life Insurance Corp. Building illustrates method of joining flashing at base of wall with that at column base.

Architects: Carson and Lundin



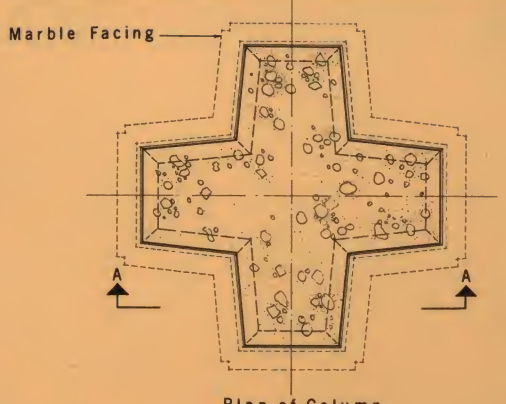
Vertical Section
Thru Column Flange



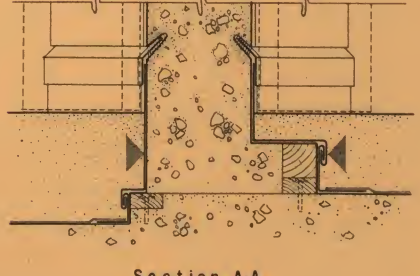


Slightly more complex base flashing on columns of Philharmonic Hall, in New York's Lincoln Center for the Performing Arts, is worked over below-grade beam, as shown in isometric above. For added protection, flashing is also set at three intermediate points of each column.

Architects: Harrison and Abramovitz



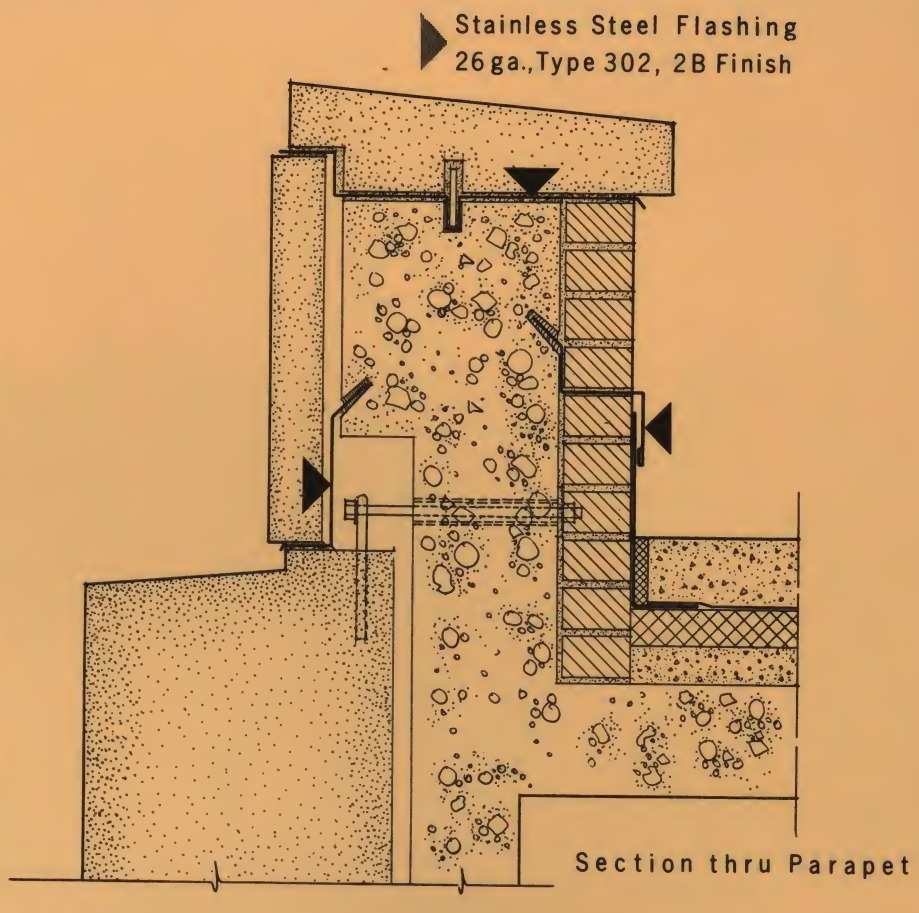
Plan of Column



Section A-A

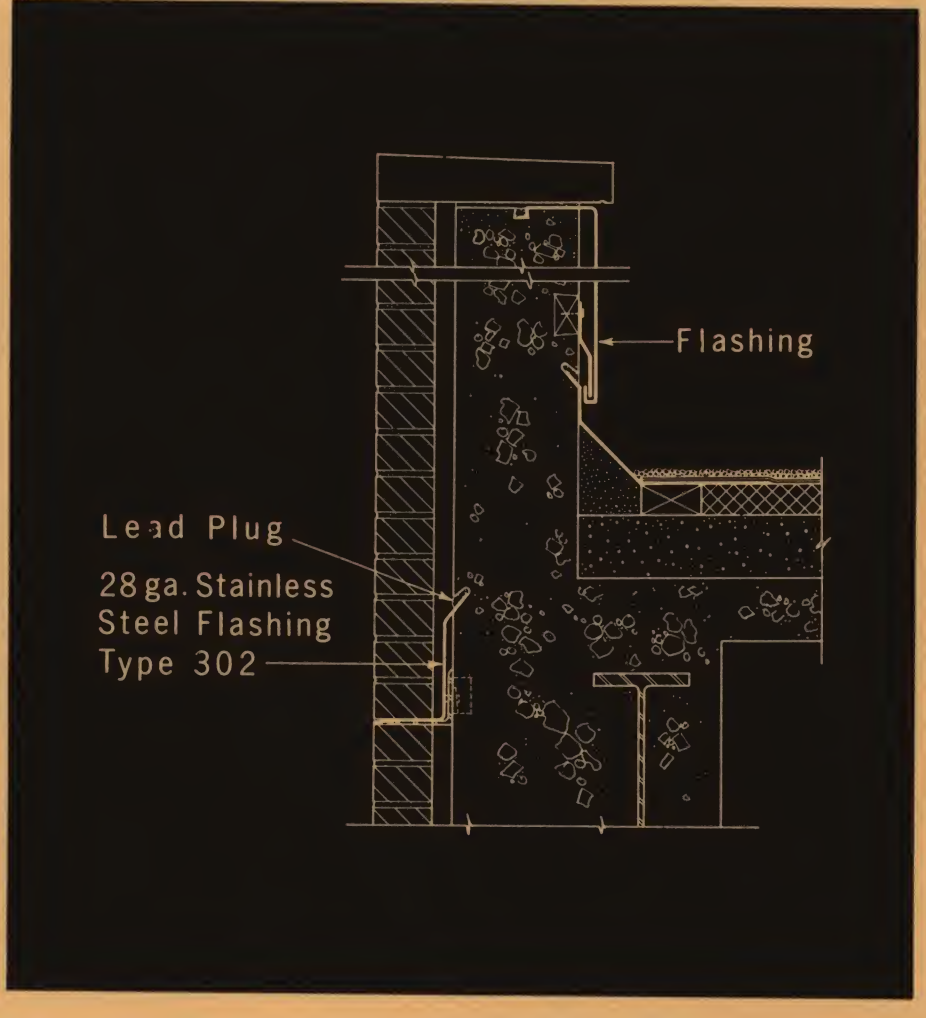
▶ Stainless Steel Flashing
26 ga., Type 302, 2B Finish

Parapet of Philharmonic Hall is fully flashed with stainless steel under coping stone and behind both inner and outer faces of parapet. Under coping stone, flashing is worked around stainless dowel to prevent penetration of moisture. Stainless steel was chosen for all flashing in this building to avoid staining on the porous light beige Travertine marble facing.



Parapet of New York Telephone Company Building at 811 Tenth Avenue, New York, illustrates a combination of stainless steel with other flashing materials. Stainless steel flashing is used behind facing, avoiding staining in a visible area.

Architects: Voorhees, Walker, Smith, Smith and Haines

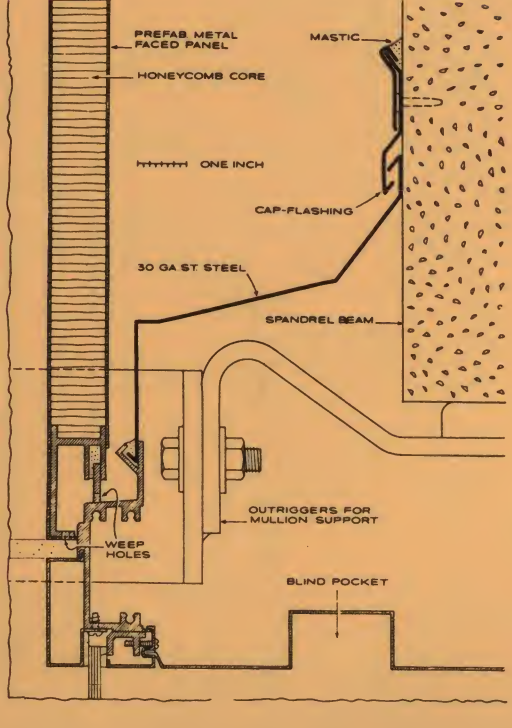


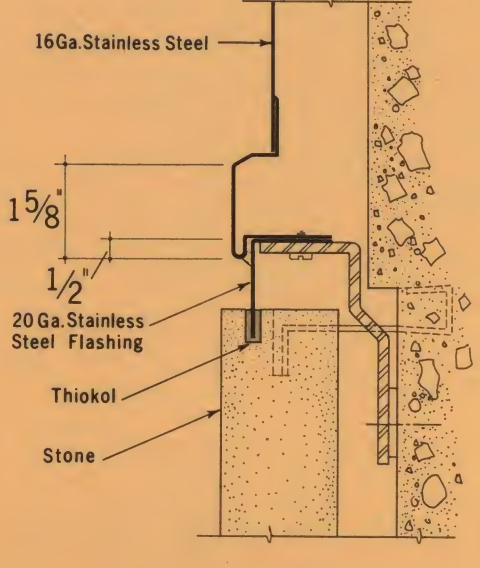
Spandrel flashing protects another critical location, where a window breaks the continuity of a wall, preventing moisture penetration at a window's head. Fresh design in Union Carbide Building, New York (above and below) calls for flashing to be set back on the spandrel beam — rather than on a projection from it — and to have a mullion cut-out.

Architects: Skidmore, Owings and Merrill

Simple application of flashing is illustrated by design of Kirkeby Center in Los Angeles. Flashing here blocks moisture flow between stainless steel spandrel at third floor level and black granite fascia. (See below.)

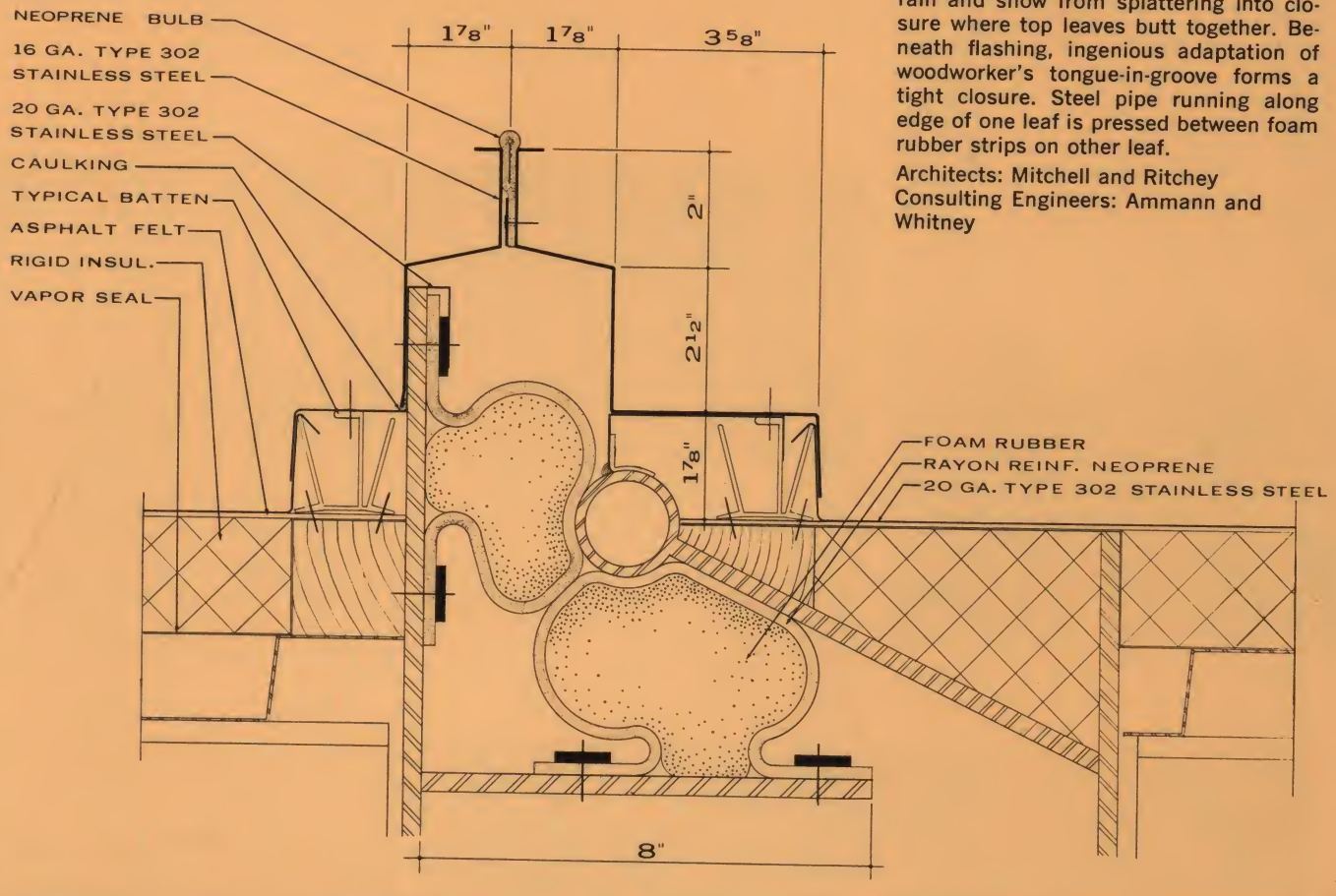
Architect: Claud Beelman





NO. 8 — STAINLESS STEEL FLASHING — AIA File No. 15-H-1

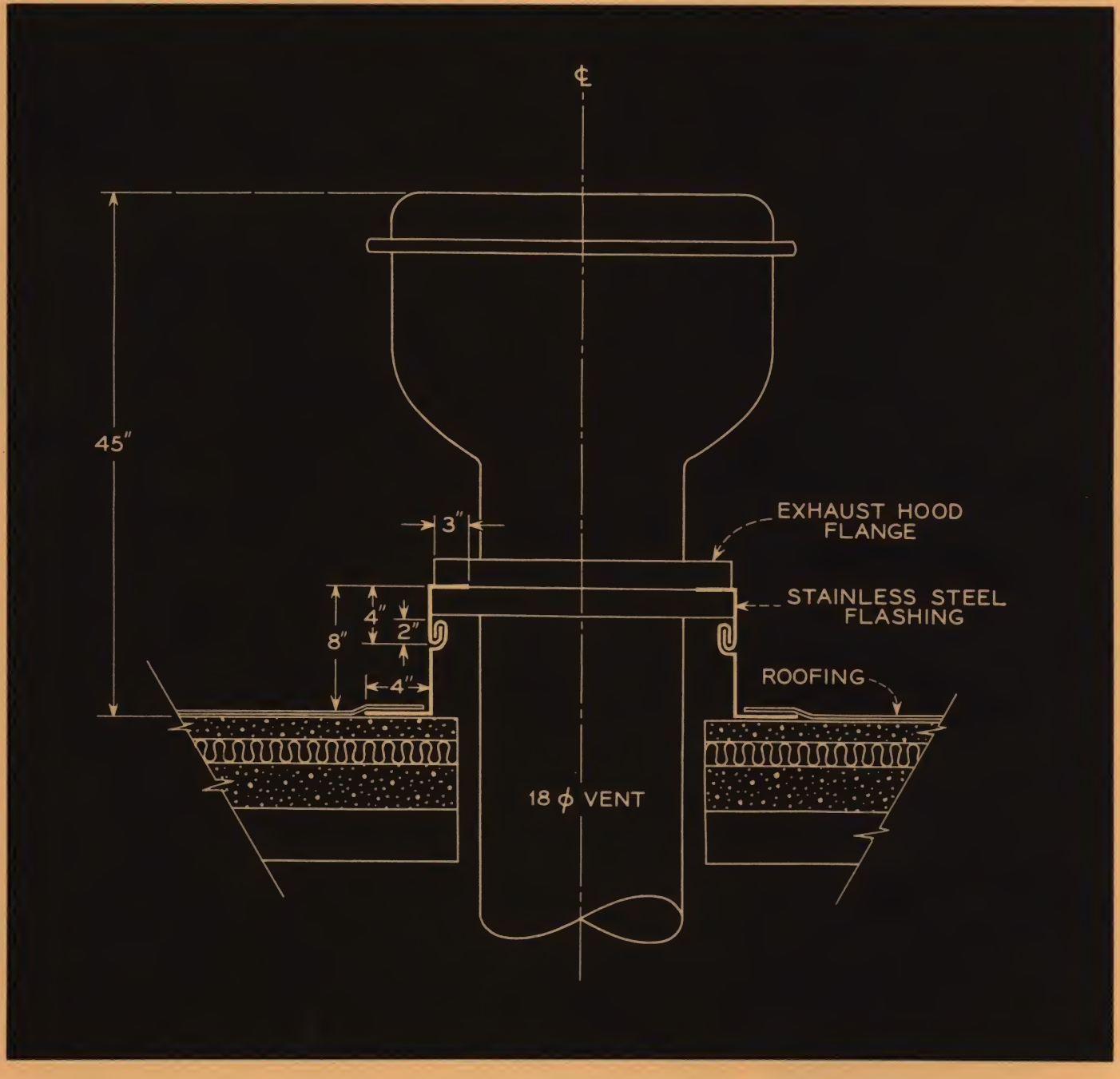
SECTION THRU LEAF CLOSURE CLOSED POSITION



Unusual design of retractable roof on Pittsburgh Public Auditorium requires exposed stainless steel flashing to prevent rain and snow from splattering into closure where top leaves butt together. Beneath flashing, ingenious adaptation of woodworker's tongue-in-groove forms a tight closure. Steel pipe running along edge of one leaf is pressed between foam rubber strips on other leaf.

Architects: Mitchell and Ritchey
Consulting Engineers: Ammann and Whitney

The roof is always a critical area for moisture penetration, and wherever a well is let into the roof or a mechanical member penetrates above roof level, the interstices must be carefully flashed to protect the roofing. Here a vent hood on the roof of Philharmonic Hall is flashed with stainless steel.



No. 8 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York 17, N. Y. To receive future numbers or additional copies, simply write to the Committee.

Stainless Steel

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 9
(1964)

Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York, N. Y. 10017

STAINLESS STEEL EXPANSION JOINTS

All materials used in construction undergo expansion and contraction as a result of changes in temperature. Consequently, some provision must be made to accommodate the resulting dimensional changes to prevent buckling, cracks, and deterioration of the structure. This is especially necessary on those parts of a building that are exposed to solar heat and the weather.

From the earliest times, builders have solved this problem with joints. Today, structures contain joints so designed and located as to allow expansion or contraction as conditions require without causing leakage or other failure. Simplest of these joints is the periodic discontinuation in sidewalk or road paving, but they can become as complex as slip joints that are fully flashed and concealed under built-up roofing.

In recommended procedures stainless steel base flashing, fascia, coping and gravel stops have simple slip-joints spaced every 24 feet, while cap, through-wall and spandrel flashings, which are partially shielded from outdoor temperature extremes, generally have slip-joints every 40 feet. Examples of recommended joints of this type will be found in the last two pages of this Data Sheet.

Stainless steel mullions and curtain-wall framing members, when these are extensive in length, also contain slip-joints that allow movement of sections.

The more complex types of joints are those fabricated from metal and set into building members of another material, generally masonry. These are installed in all areas of commercial or monumental buildings where material movement may be measurable—in floor, ceiling, wall, roof and outdoor paving.

The purpose of slip-joints is to permit lateral movement, yet prevent the penetration of moisture. The stainless steels are ideal for this purpose, since they have the following advantages:

1. Stainless is permanent. Under usual conditions the commonly used grades of stainless steels will not deteriorate. In an extremely corrosive atmosphere, such as seacoast or the neighborhood of chemical plants, the more highly corrosion-resistant grades can be used.

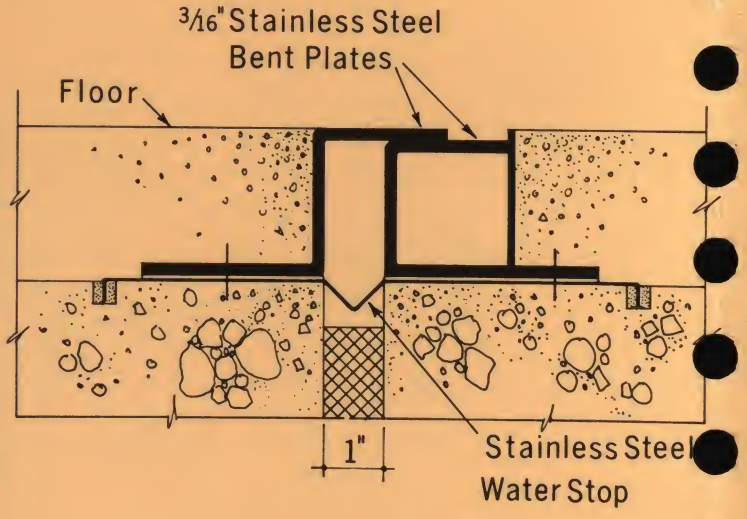
2. Besides being resistant to atmospheric corrosion, stainless is electrolytically compatible with other building materials, including masonry and mortar. These will not cause galvanic corrosion in the metal.

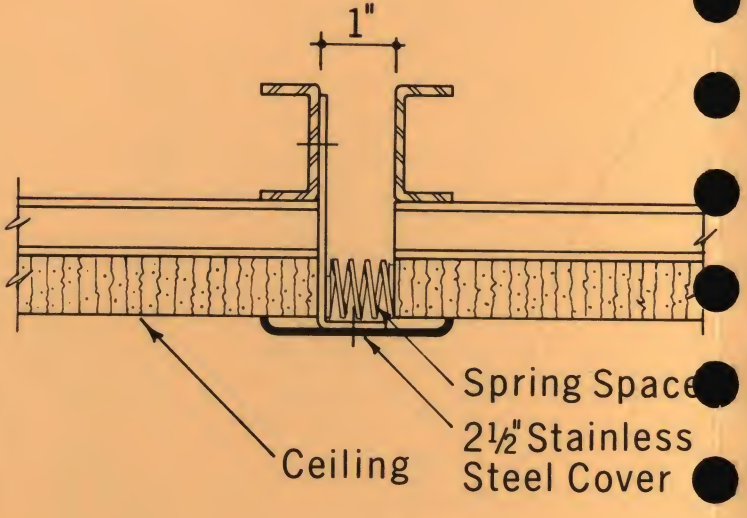
3. Stainless will not stain or discolor nearby materials with corrosion products. Hence it is ideal for use with fine light colored materials such as marble and quartz aggregate.

4. The stainless steels have higher strengths than other commonly used construction metals. They withstand pressure and regain shape easily after pressure is relaxed. Their density and hardness cause them to resist the abrasion of heavy traffic where exposed.

5. The stainless steels have lower coefficients of expansion than most nonferrous metals, compatible with that of masonry. Consequently, when designing a stainless steel expansion joint the architect does not need to take the expansion of the joint material into consideration.

In the Smithsonian Institution's Museum of History and Technology, Washington, D. C., two floor expansion joints extend the full width of the building on each floor. Joints were formed by Potomac Iron Works, Hyattsville, Md., from Type 302 stainless steel because of the metal's ability to withstand the heavy pedestrian traffic of this public area.



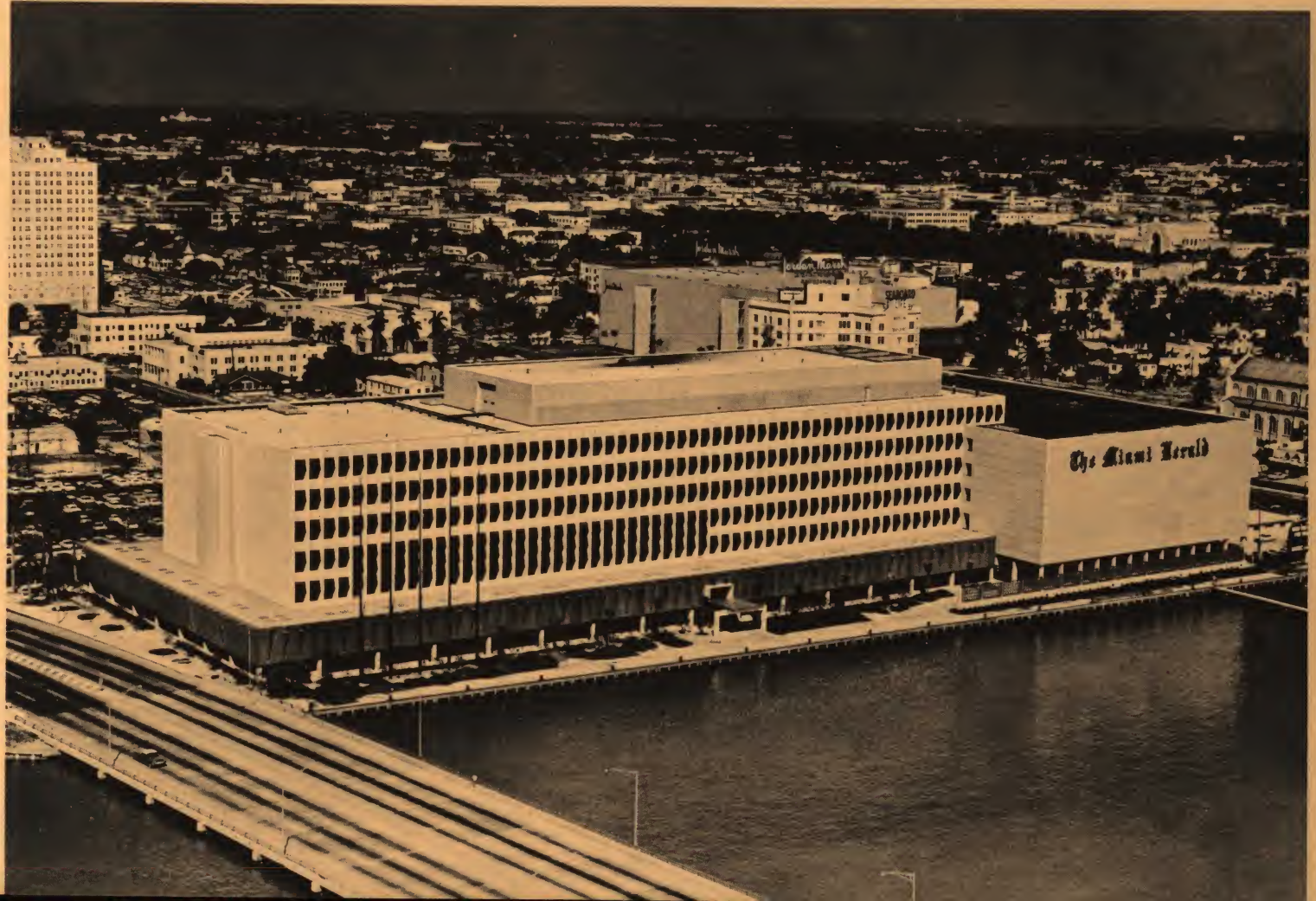


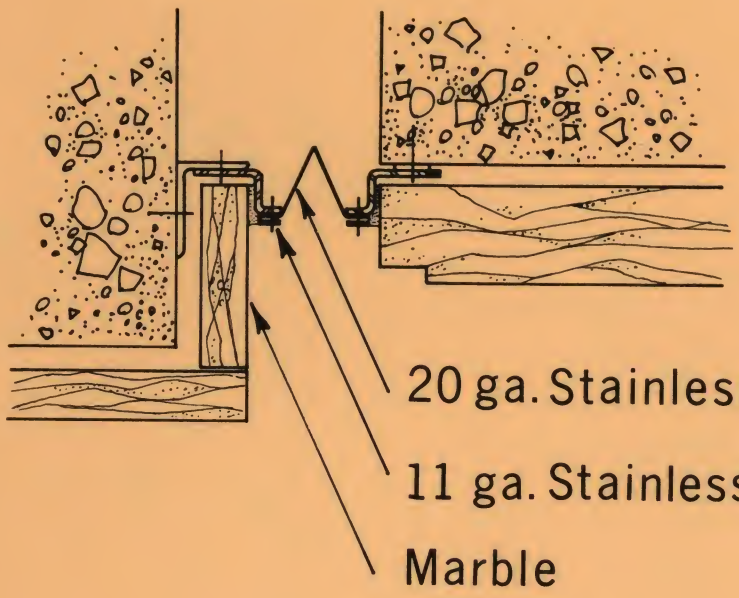
Typical wall and ceiling expansion joints used throughout the museum are covered with a stainless steel strip that is held in place by a spring clip. Stainless steel in this application retains its color and finish indefinitely with little or no maintenance.

Architects: McKim, Mead and White
General contractor and metal fabricator:
Norair Engineering Corp.

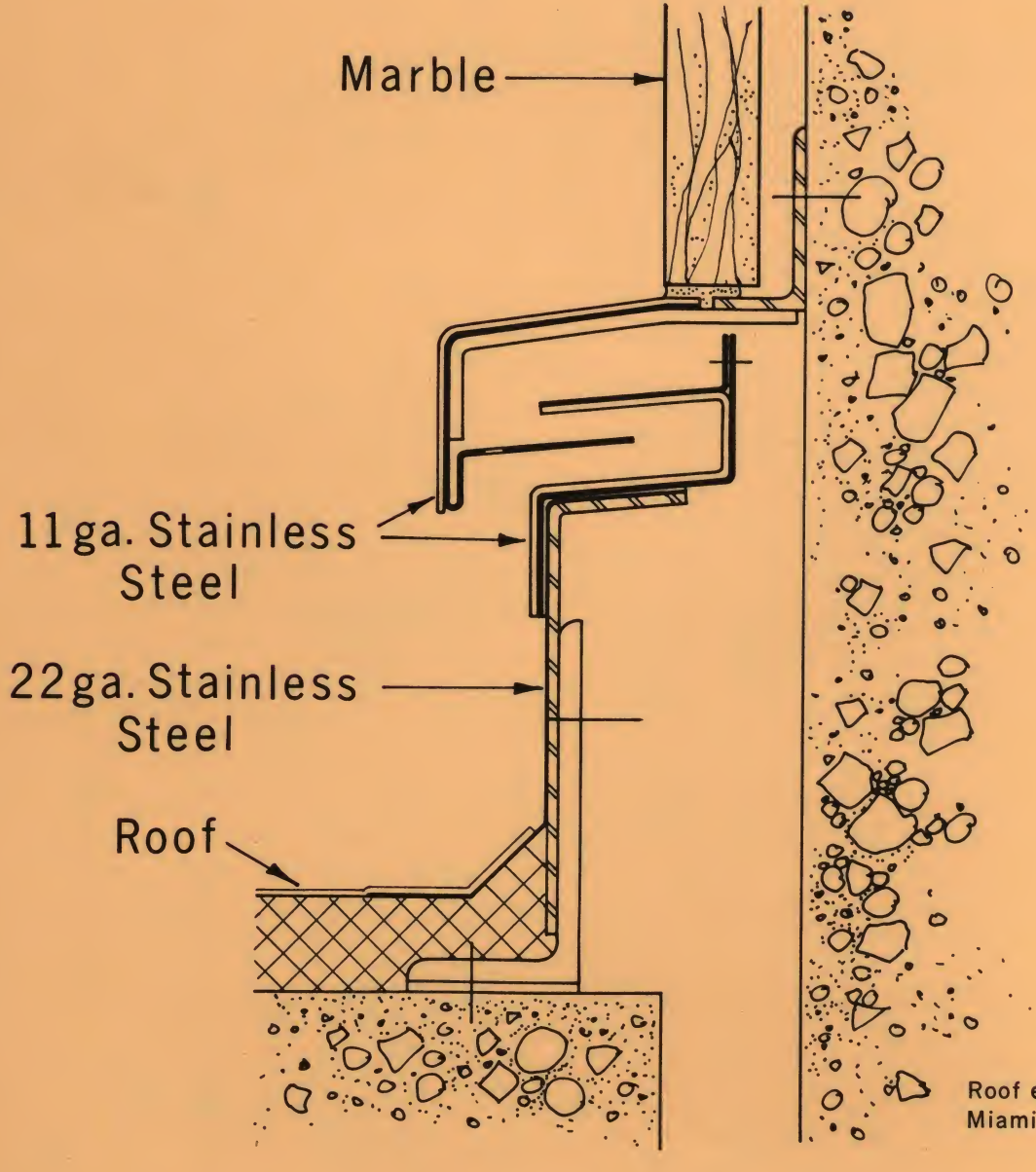
Miami Herald Building, Miami, Fla., uses large quantities of Type 316 stainless steel, a highly corrosion-resistant alloy, because of the corrosive salt atmosphere around Biscayne Bay. The building is composed of two independent structures — an office building (below, left) and a printing plant (below, right), which are separated by an air space to absorb vibrations from the presses. Stainless expansion joints, running along both wall (photo right) and roof junctures of the two structures, seal off this open area. Permanence and high elasticity make stainless especially suitable for this installation.

Architects: Naess and Murphy
Metal Fabricator: Ripple Architectural Metals





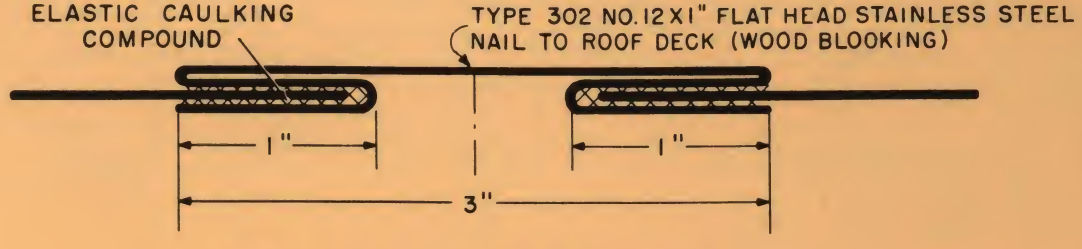
Wall expansion joint,
Miami Herald Building



Roof expansion joint,
Miami Herald Building

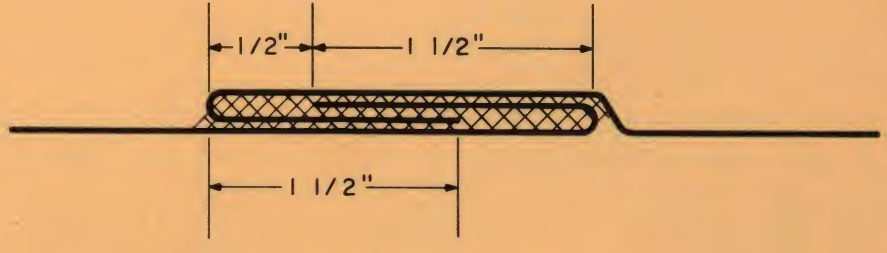
Typical expansion joints recommended for stainless steel flashing, gravel stops, fascia, and copings, allow for movement while preventing any possibility of leakage. The 3″ slip-type joint (figure 1) is let into base flashing, gravel stops, fascia and coping every 24 feet, and within 8 feet of every internal or external corner. The 1½″ loose lock joint (figure 2) is used in cap, through-wall and spandrel flashing every 40 feet. The 6″ concealed splice plate (figure 3) is an alternate for use with gravel stops and fascia, and the 6″ expansion joint (figure 4) is an alternate for gravel stops, fascia and coping. Batten type expansion joints (figure 5) are used for copings heavier than 24 gage.

FIG. 1



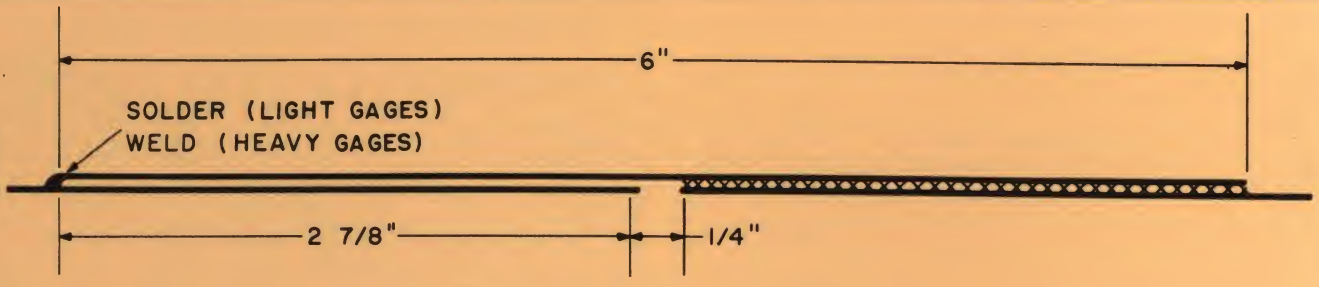
3" WIDE SLIP-TYPE EXPANSION JOINT

FIG. 2



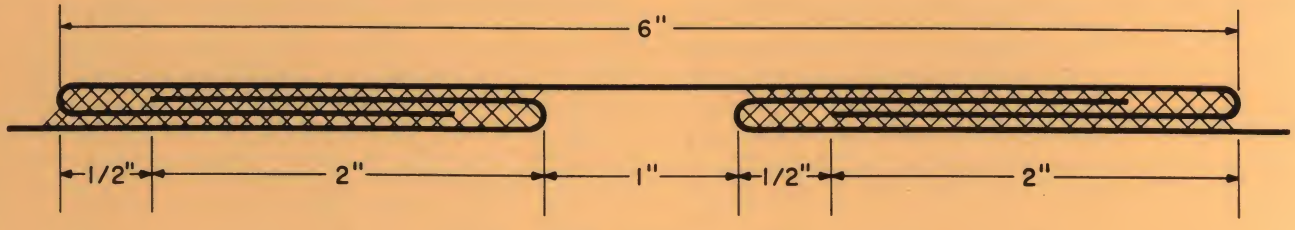
1 1/2" LOOSE LOCK EXPANSION JOINT

FIG. 3



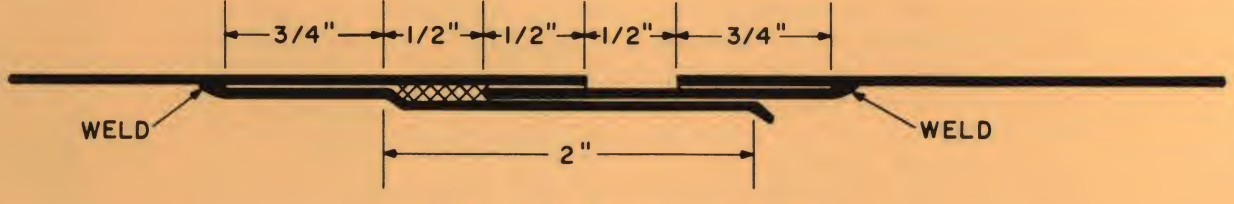
6" WIDE SPLICE PLATE

FIG. 4



6" WIDE COPING CAP

FIG. 5



BATTEN-TYPE EXPANSION JOINT

No. 9 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York, N. Y. 10017. To receive future numbers or additional copies, simply write to the Committee.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 10
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York, N. Y. 10017
(1964)

STAINLESS STEEL ENTRANCE DOORS

Stainless steels are finding increased use for doors of all types, both at building entrances and in interior partitions. Stainless doors are not restricted to commercial buildings or store fronts — although they are most widely specified for such locations — but architects have begun to specify them for quality residences also.

Stainless doors are used so widely because of the excellent way in which they fulfill the functional requirements of a door. Basically these requirements are:

1. The door must provide ease of entry, yet be secure against unwanted intruders.
2. It must effectively exclude noise, dust, heat and cold.
3. It must withstand the abrasion of heavy traffic.
4. It must have an inviting appearance —especially if it is used in a storefront installation.

Stainless steels fit these requirements to a high degree:

1. *Entry and security.* Their high strength-weight ratio permits the use of light gages and slender sections. In doors this means a relatively light weight and consequent easy handling.

At the same time, a stainless door has the strength and rigidity needed for security. No matter how strong a lock may be, a door of softer metal or wood can sometimes be sprung and entered, often leaving little or no evidence of tampering. However, because of the strength of the metal, a well designed stainless door is extremely difficult to spring, and if a trespasser does exert enough power to spring it, he cannot tamper with the door without leaving evidence. And insurance companies require evidence before they will cover burglary losses.

2. *Tightness.* Because of the high rigidity and yield strength of the stainless steels, a stainless door will not sag out of line from constant buffeting or from the action of closing-devices. A stainless steel door will tend to remain snug in its frame, keeping noise, dust, heat and cold outside.

No. 10 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York, N. Y. 10017. To receive future numbers or additional copies, simply write to the Committee.

Stainless also has the lowest thermal conductivity of all structural metals, and the one closest approaching that of glass. This minimizes formation of condensation on the metal areas.

3. *Traffic.* Stainless is the hardest architectural metal available, and its surface withstands the scratches, kicks and blows of constant use.

4. *Appearance.* Stainless steel is an ideal material for an attractive entrance. It has a bright, reflective surface which does not obtrude but blends well with surrounding colors and textures, reflecting and accentuating them. Stainless retains its color and gleam indefinitely. It will not corrode under usual conditions, nor will it discolor or weather. And it retains its good looks with very little maintenance. Generally, simple washing with detergent and water is all that is needed.

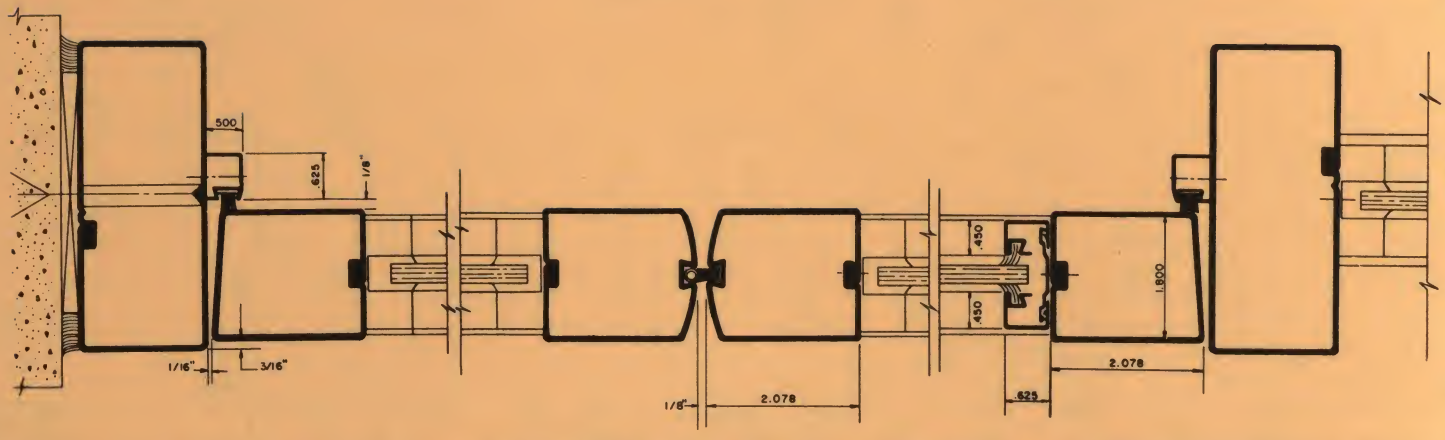
Because of the strength of stainless, extremely slender and delicate framing members can be utilized. The use of such members in an entrance permits maximum use of glass—resulting in an entranceway in which light and spaciousness predominate. This is a great advantage in storefronts.

Entrance doors fall into the following categories, all of which can make extensive use of stainless steel:

• *Swinging doors,* with centered or with offset pivots. These are available both as stock items and custom-made. Exterior doors for public entrances generally have large areas of glass within the stainless steel frame, but doors in interior partitions are often fully sheathed in stainless.

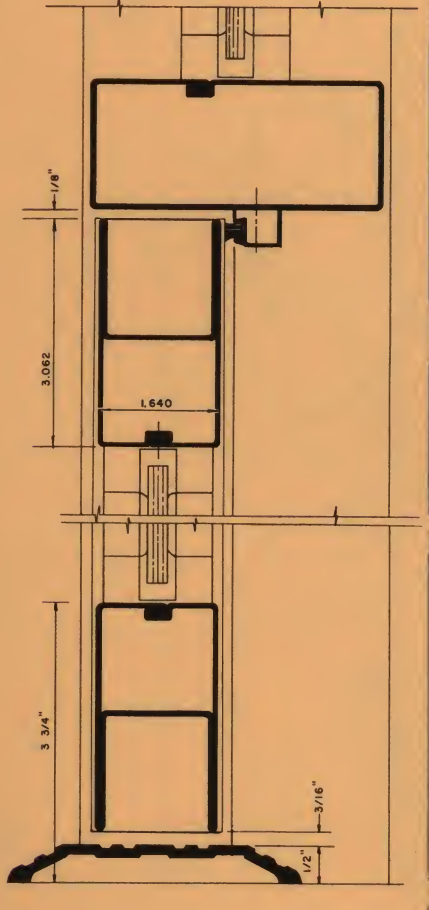
• *Revolving doors.* These are widely used for commercial and monumental structures, and stainless finds much use in this field.

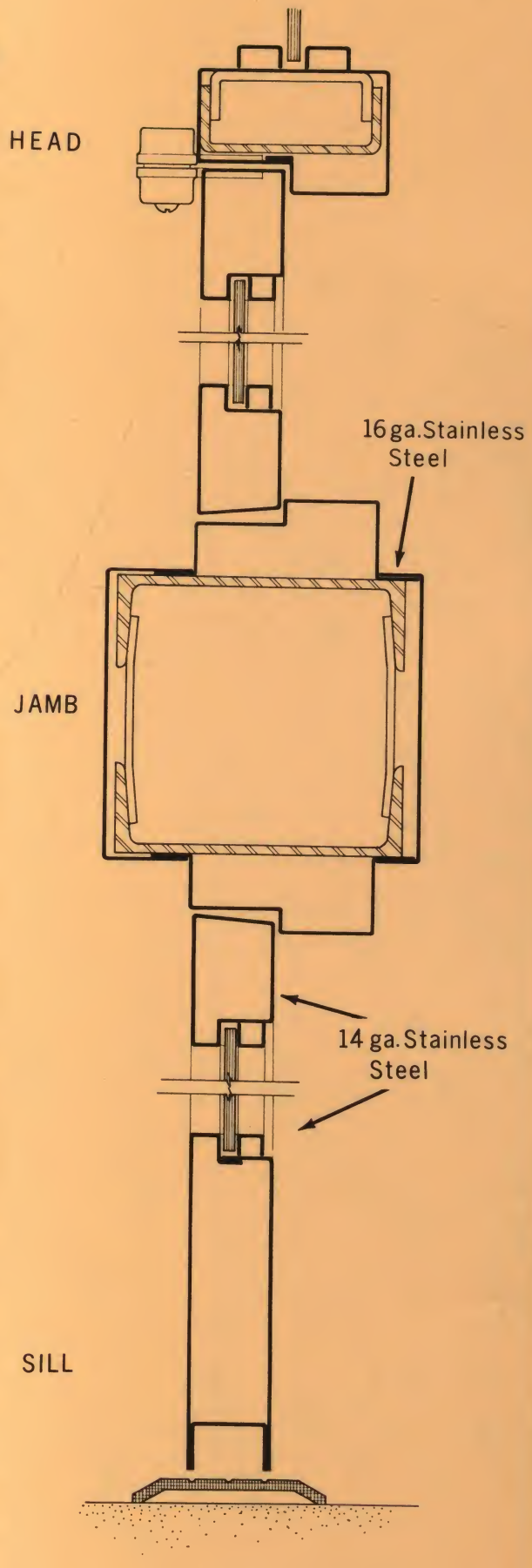
• *Sliding doors.* Although these have been custom-made in stainless steel for some time, it is only in the past year that stock stainless sliding doors have appeared on the market and have begun to be used in residential as well as commercial and public structures.



Attractive new stainless steel swinging doors at Allstate Glass Co., Boston, Mass., are strong and permanent, yet economical. A stock item, the door is made from roll-formed sections that are relatively light in weight, yet have great rigidity. Snap-in molding can be removed only with a special tool and permits installation of glass thicknesses from 7/32 inch to 5/16 inch.

Fabricator: The Alumiline Corp.

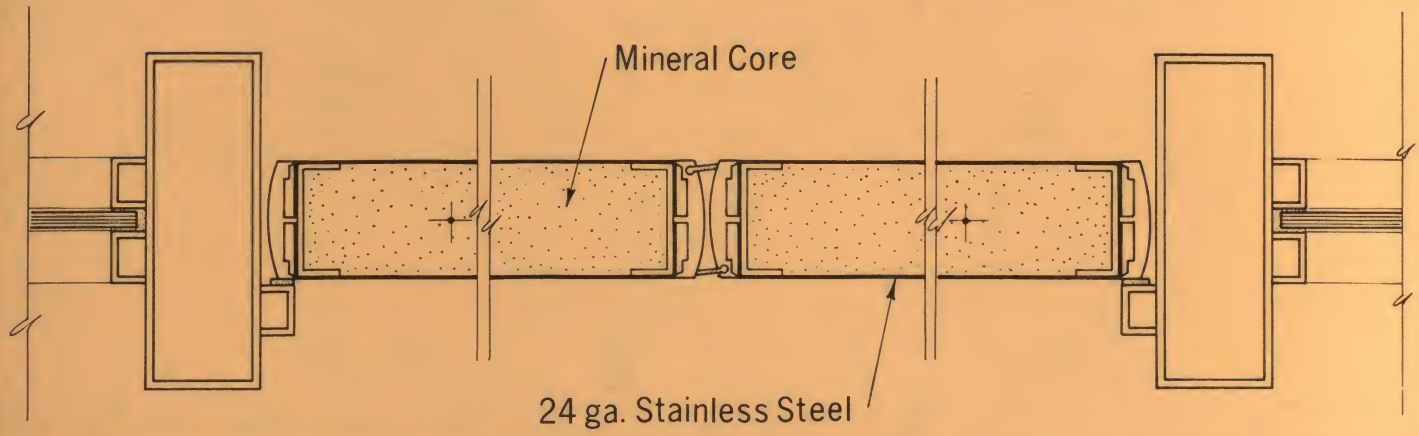




Monumental entrance of the Marine Trust Company, Buffalo, N.Y., includes narrow-line stainless steel doors custom-built for the building. Doors such as these form an open-looking, inviting entrance, yet are too strong to be sprung by intruders or to sag from the buffeting of traffic.

Architects: James, Meadows and Howard

Fabricator: Trio Industries, Inc.



Interior doors in the Hardridge Road School, Tonawanda, N.Y., are formed of stainless steel sheathing around a solid mineral core. Stainless steel is color coated a deep maroon, embossed with a pattern, and highlighted by polishing to bring out the metallic gleam on the raised parts of the pattern. Embossing makes the door more resistant to impact and denting. The pattern helps to conceal scratches and finger-prints.

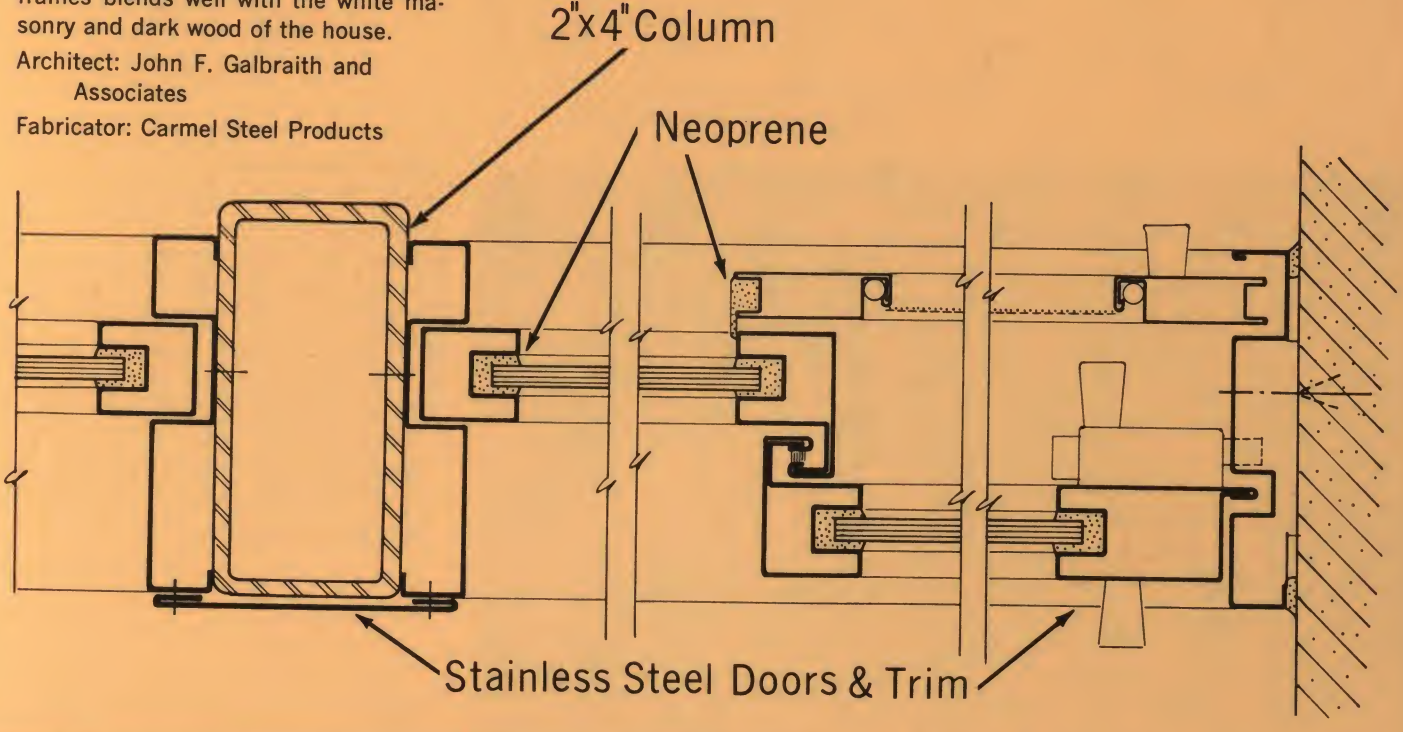
Architects: Fenno, Reynolds and Jones

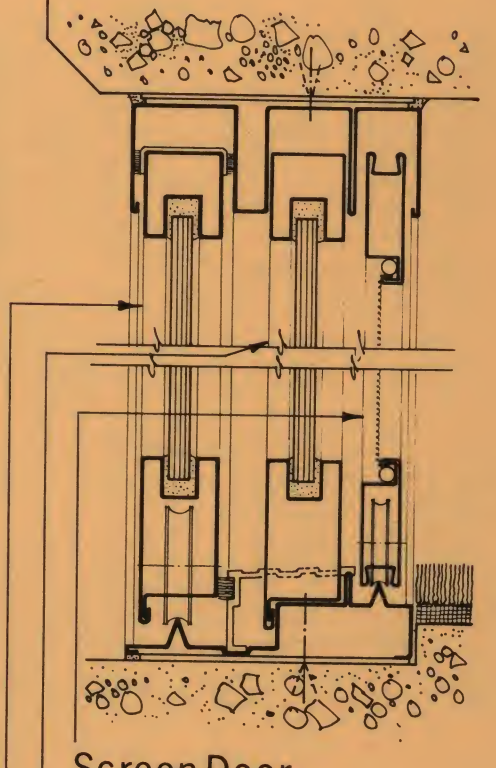
Fabricator: Dusing and Hunt, Inc.

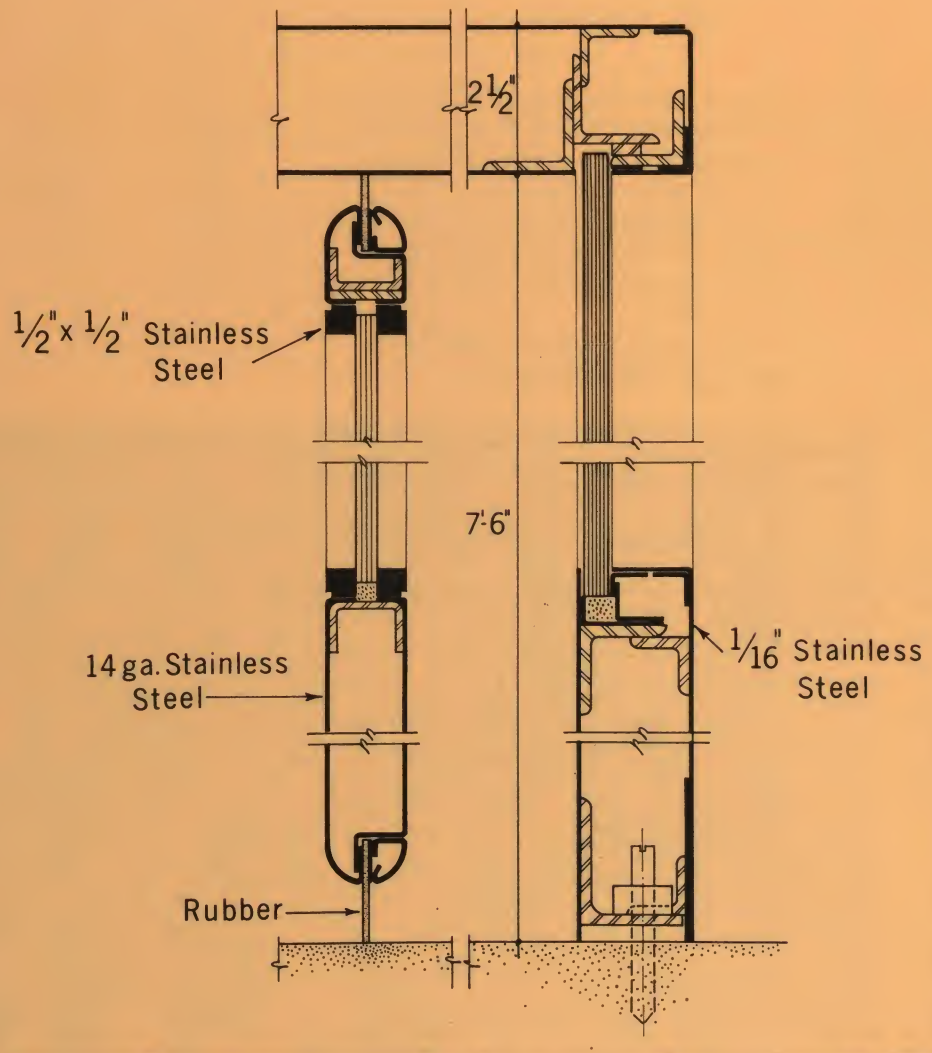
Stainless steel sliding doors contribute to the feeling of clarity and spaciousness that has been designed into the "House of Excellence" at Laguna Niguel, California. Tubular roll-formed sections provide high strength along with slender lines. Gleaming finish of doors and stainless steel railings and window frames blends well with the white masonry and dark wood of the house.

Architect: John F. Galbraith and Associates

Fabricator: Carmel Steel Products







Revolving doors of stainless steel grace the entrance of the Michigan Consolidated Gas Company building in Detroit, Mich. Stainless Steels are especially advantageous in this type of installation because of their ability to withstand heavy traffic: a revolving door in a busy building can permit up to 2,880 people to pass each way in one hour.

Associate architects: Minoru Yamasaki—Smith, Hinchman and Grylls

Fabricator: International Steel Co.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 11
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York, N. Y. 10017
(1965)

STAINLESS STEEL IN STOREFRONTS

The purpose of a storefront is to:

1. Identify and characterize the store by displaying both the name and wares in an appealing manner.

2. Serve as a stage on which to present fully and clearly the merchandise —or service—being provided inside.

3. Be open and inviting, so that the prospect who stops to look at the store more closely will be drawn inside.

To fulfill the vital function that the storefront is intended to serve, careful attention should be given to the materials from which it is made, as well as to the design. The stainless steels have a number of specific advantages that make them ideal for storefront applications.

Advantages of Stainless

When stainless steels are used as framing, entrance doors, railings, fascia, or kick-plates in a storefront installation, they contribute a great measure of success to these functions. This is because their inherent characteristics permit fine design, easy maintenance, and permanence.

The foremost advantage of the stainless steels is their resistance to corrosion. This means that stainless steel storefronts are permanent, retain their attractive appearance indefinitely with no need for refinishing or replacement.

Further, stainless members will not corrode or discolor under usual service conditions, or form any corrosion products that could stain adjacent materials. As a result, such quality materials as white marble and quartz aggregate can be used next to stainless with no fear of discoloration.

Since stainless has greater hardness and density than other architectural metals, it resists the wear and tear of the heavy traffic so common to storefront installations. It withstands scratching and denting better than any other construction metal.

Ease of Maintenance

Another functional advantage is that stainless is easy to clean. Its dense surface does not absorb dirt, and merely washing during the regular window cleaning operation will keep the metal in its pristine gleam. Around an entrance, cleaning with a commercial stainless steel cleaner will remove finger marks easily.

One advantage of particular value in window framing installations is the low coefficient of expansion of stainless steel when compared to non-ferrous metals. Since it is quite close to that of glass, framing members can be designed to remain snug, and little relative movement between frame and glass can be expected as a result of temperature changes.

From the point of view of design, the high strength of the stainless steels is particularly advantageous. Stronger than all other metals commonly used in architecture, stainless can be thinner, providing lightweight members with no sacrifice of strength. Rigid framing members can be formed with an extremely slender cross section, creating a storefront with an open, inviting appearance and little or no interference in sightlines.

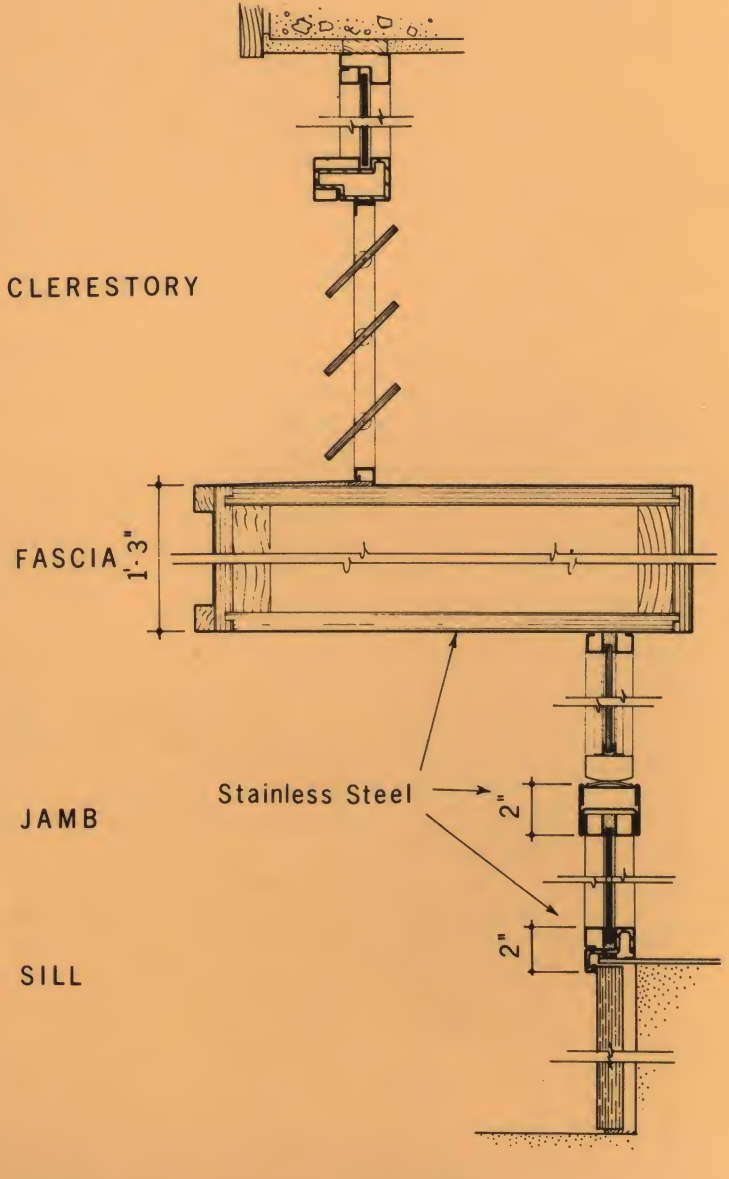
The designer of a storefront can also take advantage of stainless' aesthetic features. Stainless has the capacity of blending with other materials without clashing or being obtrusive. Its reflectivity picks up light and color, highlighting adjacent materials and striking a pleasing contrast with them.

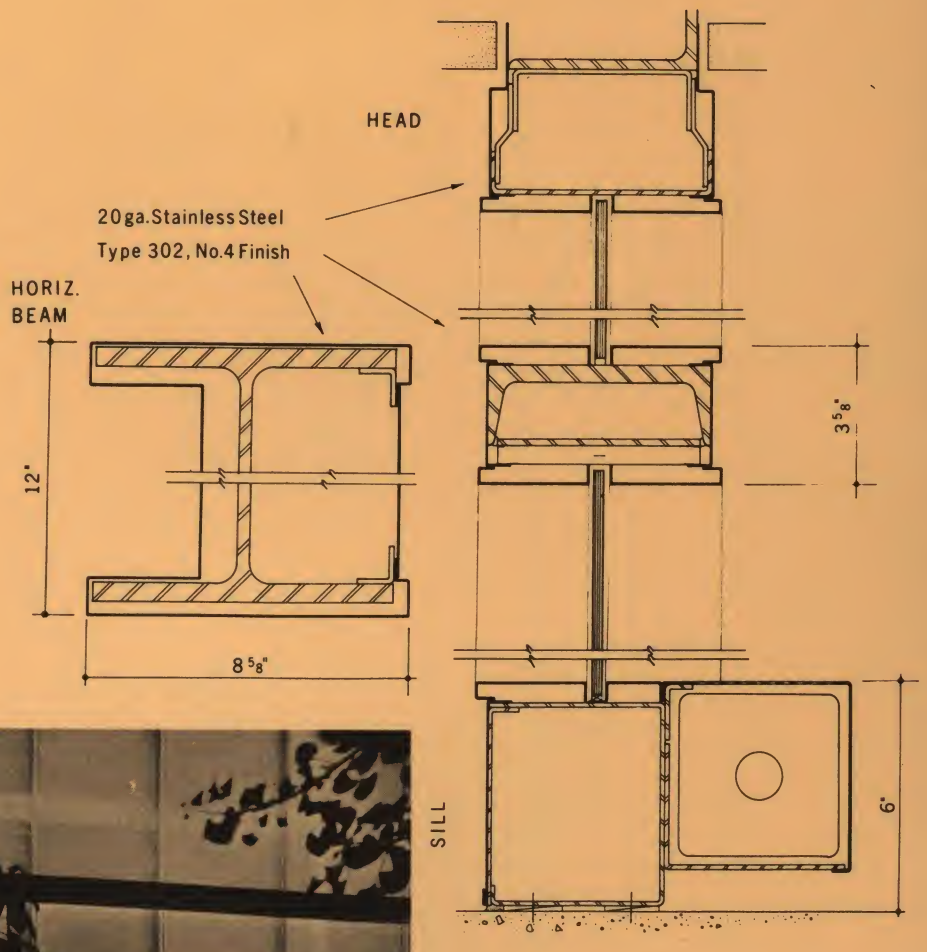
No. 11 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York, N.Y. 10017. To receive future numbers or additional copies, simply write to the Committee.

An economical storefront can be both graceful and functional in stainless steel. This stock entrance and window wall on Buck and Ryan, Ltd., a machine tool supply store in London, England, was fabricated in the United States. Because of the strength, hardness and rigidity of the metal, stainless steel architectural components can be transported great distances with no damage. Stainless steel is Type 302 with No. 4 finish.

Architects: Matthews and Son

Fabricator: Schacht Associates, Inc.





Custom remodeled storefront of Air France's ticket office on Fifth Avenue, New York, derives spaciousness from setting the second story back, like a mezzanine, behind a nearly unbroken wall of glass framed in stainless steel members. Structural steel beam across front was beautified by stainless sheathing and the Air France name in luminous white letters.

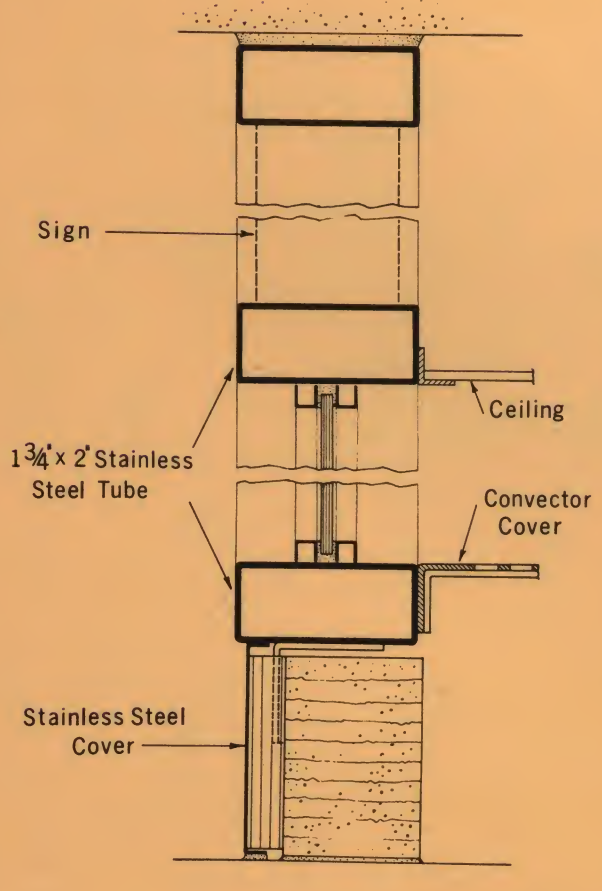
Designers: Marvin B. Affrime (Director, The Space Design Group, Inc.) and Robert Pontabry

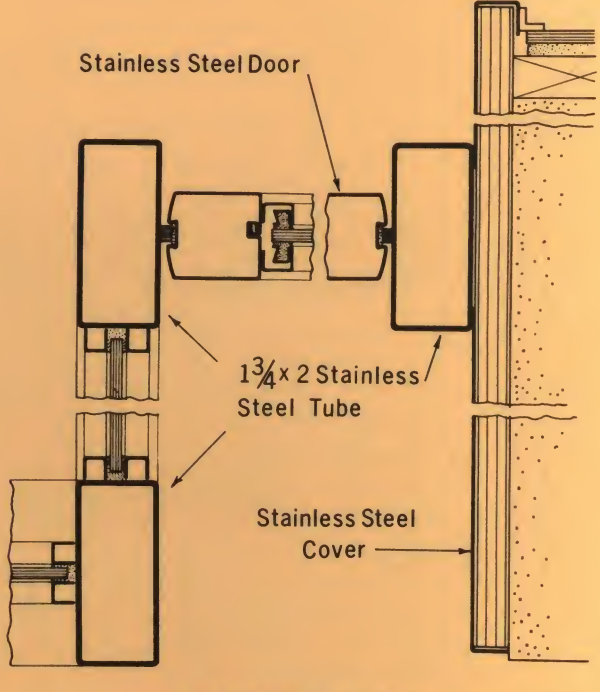
Fabricator: Haber and Henry, Inc.

Simple stainless steel window wall brightens the Chock Full O'Nuts branch restaurant at Seventh Avenue and 29th Street, New York. Wall framing is of Type 302 stainless rectangular tubing with a finish similar to No. 4 sheet finish, designed around a stock stainless steel door.

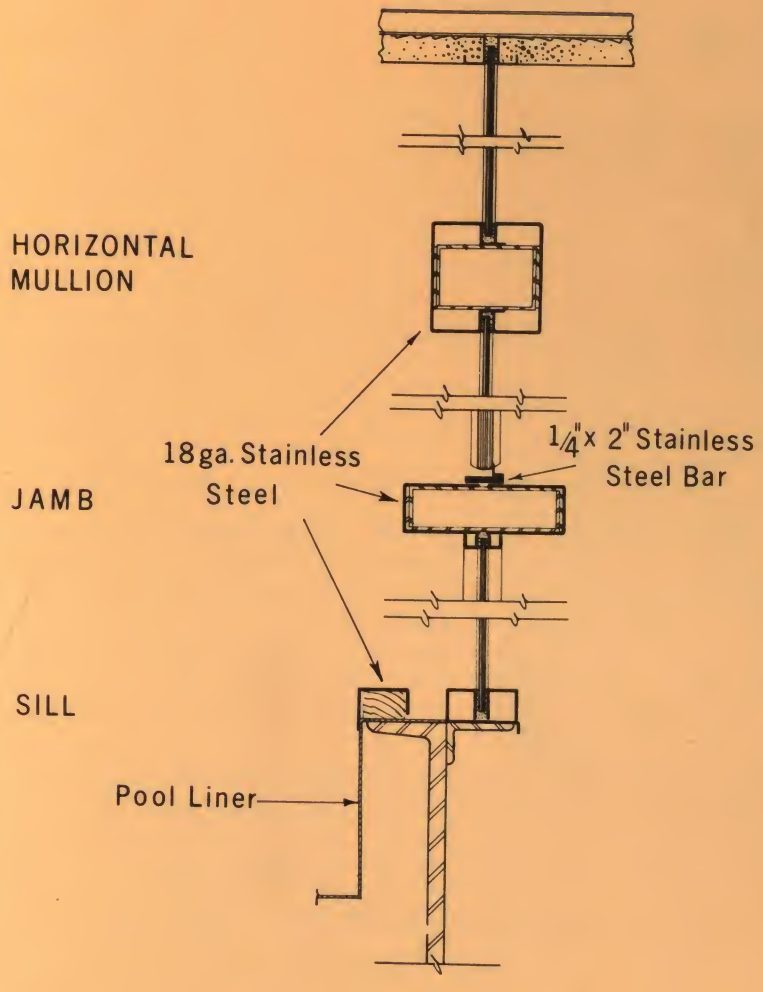
Builder: Herbert Construction Company

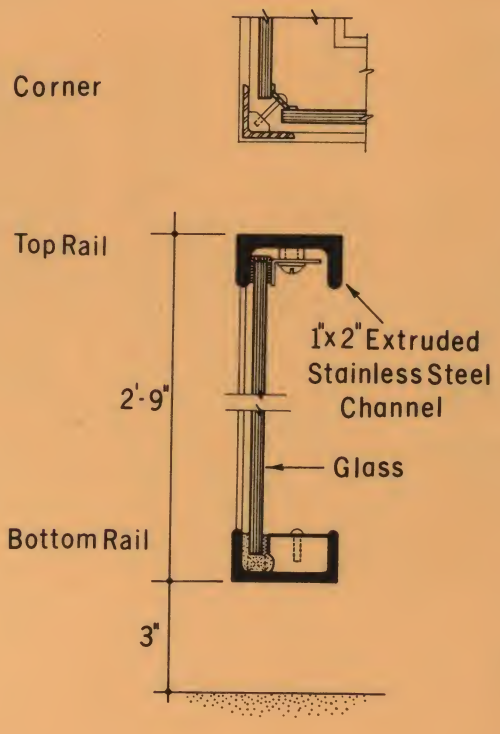
Fabricator: Haber and Henry, Inc.





ENTRANCE DETAIL

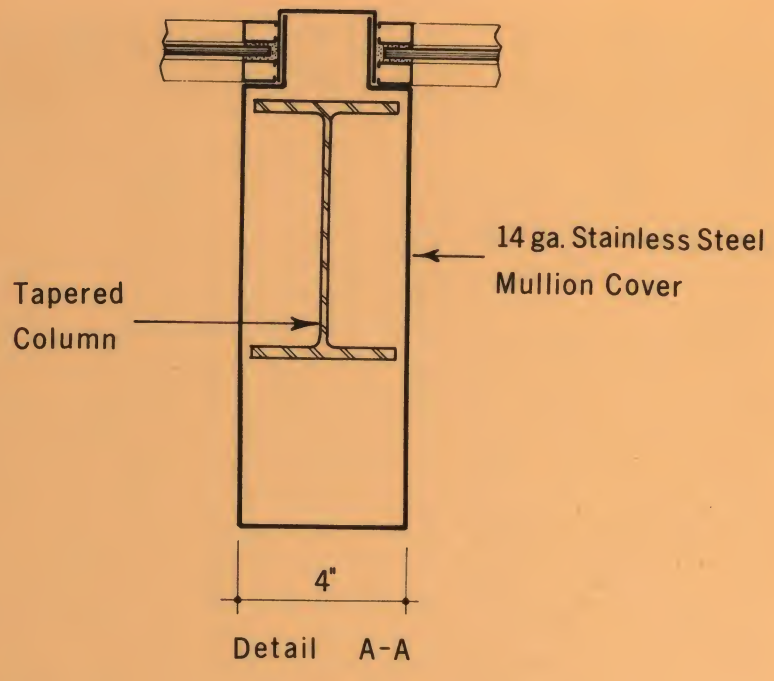




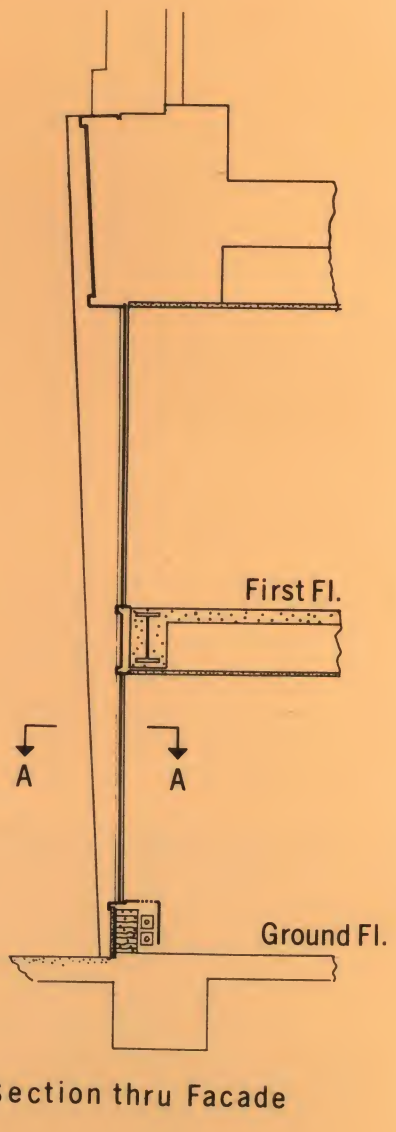
Small storefront, designed for maximum openness with slender stainless steel framing, gives an inviting appearance to the First National Bank Travel Service, Middletown, Ohio. All framing is made from stock sections of Type 302 stainless with a No. 4 finish.

Architect: Harold Goetz, Jr.

Fabricator: Reliance Art Metal Co.



Detail A-A



Section thru Facade

Redesign of the facade of 18 E. 41st Street, New York, turned an unsightly older building into an attractive modern one, now occupied by the Palladium Restaurant. Type 302 stainless steel mullions with a No. 4 finish slope gradually outward as they rise, a design feature with functional as well as aesthetic purpose: mullions must be close to the building face at bottom to permit use of a sidewalk lift, while at top of the second story they slope forward to hide the dirt-catching stonework of the old facade.

Architect: Joseph Kiell

Fabricator: Marks Bros. Inc.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 12 (1965)
Committee of Stainless Steel Producers • American Iron and Steel Institute
633 Third Avenue, New York, N. Y. 10017

STAINLESS STEEL SPANDRELS

The spandrel, which in classical architecture was a relatively minor area between arches, is an important element of design in the rectangular grid of the modern curtain wall. Here it serves to accentuate either the horizontal or vertical line of the wall by blending or contrasting with mullions or windows. The architect is able to effect such a blend or contrast by his choice of material, texture and color in the spandrel.

Visual Versatility

Stainless steel is a versatile material for spandrel use because it is available in a great variety of finishes and surface treatments. Those that have been most successfully used in spandrels are:

1. *Mill finishes.* Although a number of finishes are available, those most commonly used in architecture are the ones designated AISI No. 2D, No. 2B, and No. 4.

No. 2D finish is a dull, cold-rolled one that is often recommended for broad areas, such as spandrels, where the architect desires to avoid reflections. Stainless steel spandrels with this finish generally have a broad die-pressed pattern that may add to the rigidity.

No. 2B finish is a bright, cold-rolled finish generally used for accent. In spandrels it most often appears as framing or accent lines in composite spandrels.

No. 4 finish is a polished finish with parallel grinding lines that give a bright, directional reflection of light. No. 4 is often used, either flat or with a die-pressed pattern, in spandrels.

2. *Colored stainless steel* is obtained by applying ceramic or organic coatings, or by a chemical oxidizing process. Color coated stainless steel is more permanent than other coated metals, because the underlying stainless will not corrode and cause peeling or flaking of the coating.

3. *Texturing*, either with a fine, rolled pattern or a large die-pressed one, is often recommended for several reasons. First, it can give texture and visual interest to a broad, flat area of metal. Second, it breaks up reflections which the architect may regard as distracting, while maintaining the brightness of the surface. Third, it may add to the rigidity, thus preventing optical distortion and sometimes permitting the use of thinner metal. Textures can be successfully worked into either plain or colored stainless.

4. *Highlighting* is obtained by polishing the raised portions of textured stainless steel, while leaving the depressed portion either in a cold-rolled finish or color coated. This adds brightness and an element of depth to a spandrel area.

No. 12 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 633 Third Avenue, New York, N.Y. 10017. To receive future numbers or additional copies, simply write to the Committee.

Functional Advantages

Besides its visual versatility, stainless steel is functionally ideal in spandrel applications because of its resistance to corrosion. Under usual conditions, stainless will not corrode, pit or discolor, and is generally sufficiently cleaned by weather. In areas of heavy soot deposit, chemical fumes or airborne ocean spray, occasional washing may be recommended. This can usually be accomplished as part of the regular window-washing operation.

Whenever light gage stainless steel is used over a broad area, such as a spandrel, the architect may want to consider means of avoiding optical distortion or "oil canning". This is a problem common to all reflective materials, but since stainless retains its bright finish indefinitely, special care sometimes needs to be taken with it. Briefly, recommonded procedures are:

1. Back the light gage material with a stiffener. Another strip of stainless can fulfill this purpose; so can a sheet of plywood or composition board.

2. Specify a relatively thick sheet, so there will be no danger of buckling.

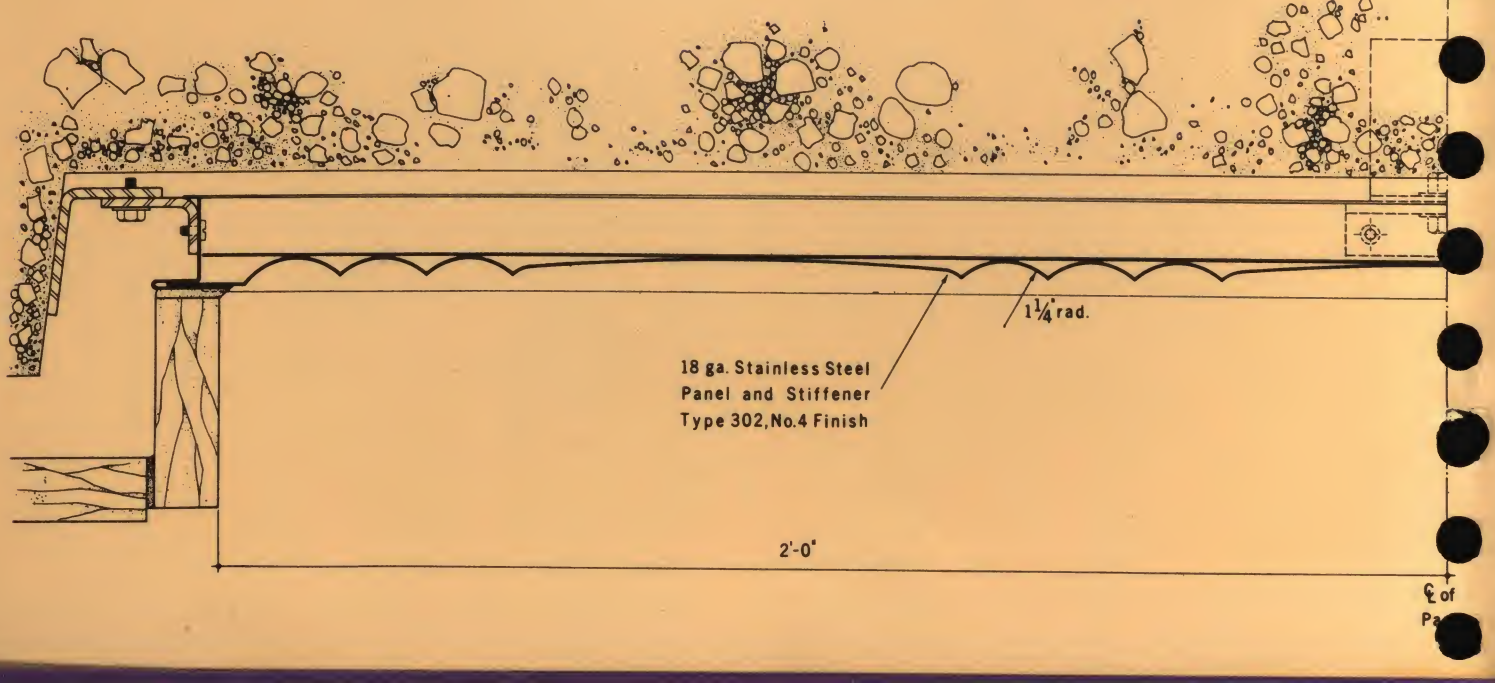
3. Make the metal more rigid with a three-dimensional pattern.

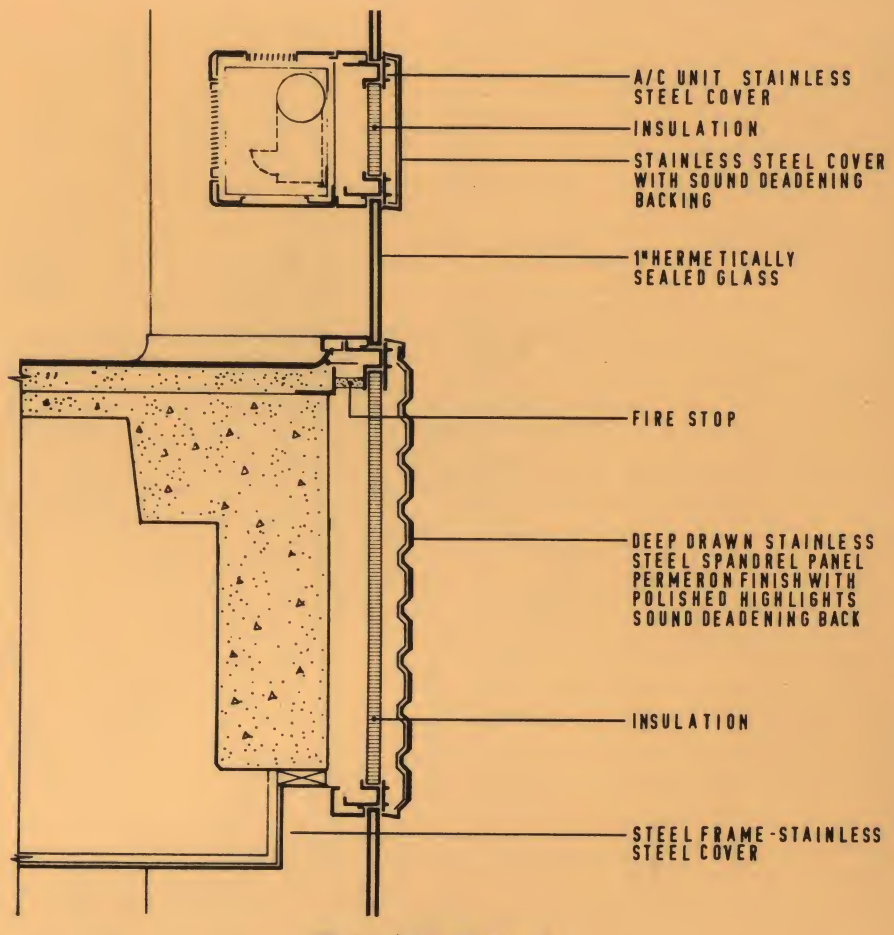
4. Break up surface reflectiveness with a texture; this may also add to the rigidity.

Gleaming stainless steel spandrels with No. 4 finish alternate with piers of white marble in the curtain wall of Kirkeby Center, Los Angeles. Fluted to reduce light reflection and eliminate optical distortion, spandrel panels are backed by horizontal stainless stiffeners.

Architect: Claud Beelman

Fabricator: Construction Metal Work Co.





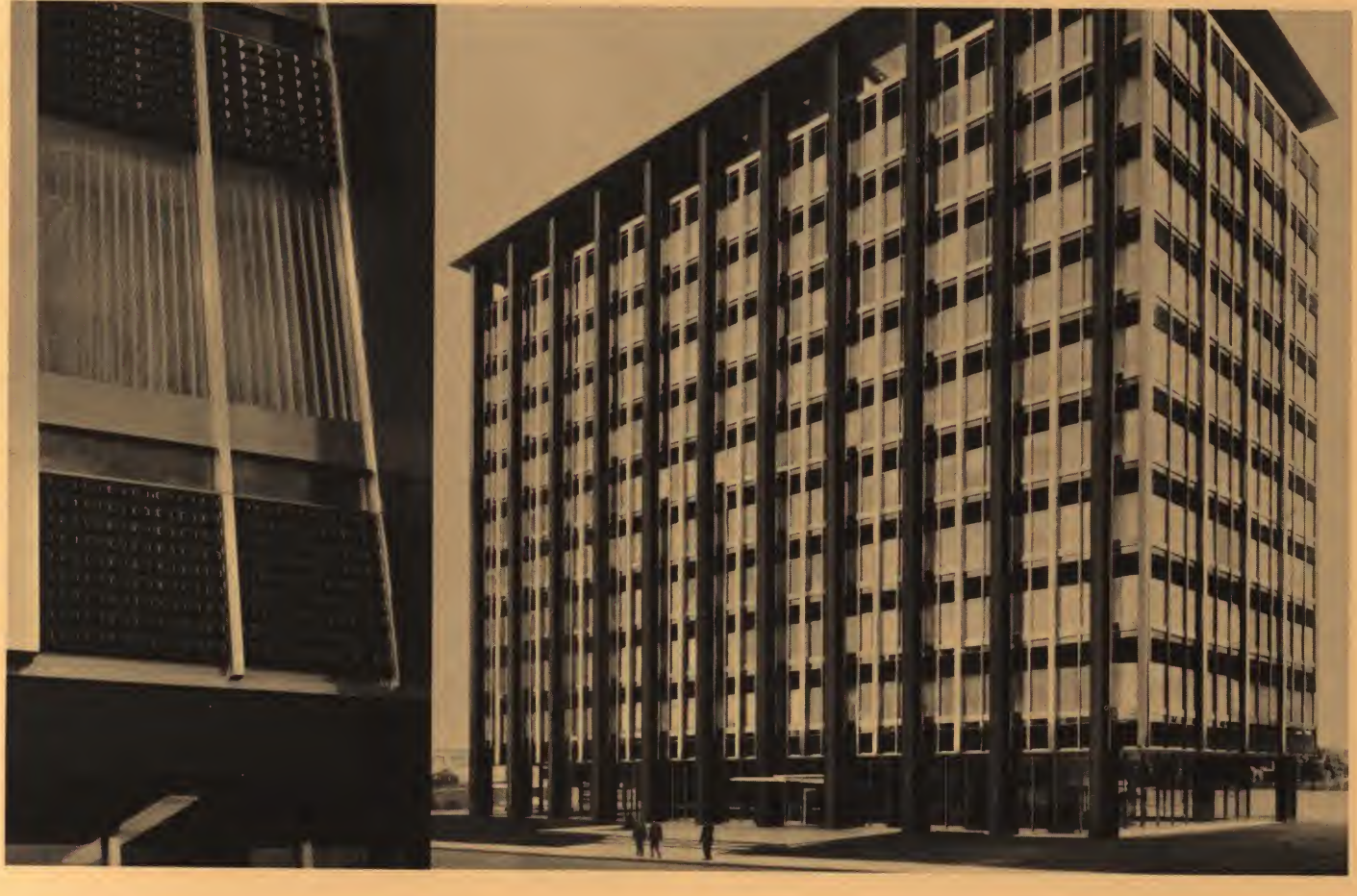
Typical Wall Details

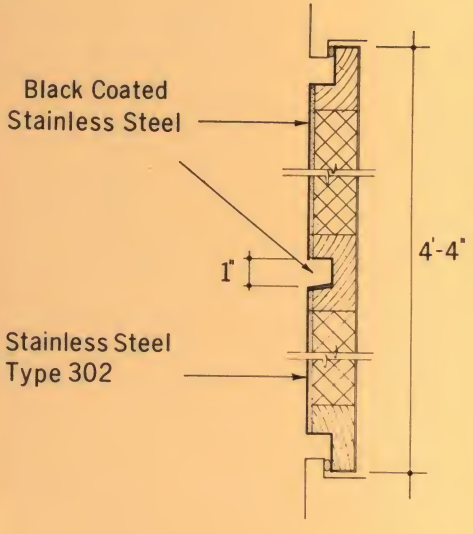
Color-coated and highlighted spandrels of Union Carbide Building, Toronto, have a deep-drawn pattern symbolizing the corporation's trademark. After the pattern had been formed in sheets of Type 301 stainless steel, a black organic coating was applied, and the raised surfaces then polished to expose the underlying metal. This gives an illusion of deeper textural design than actually exists.

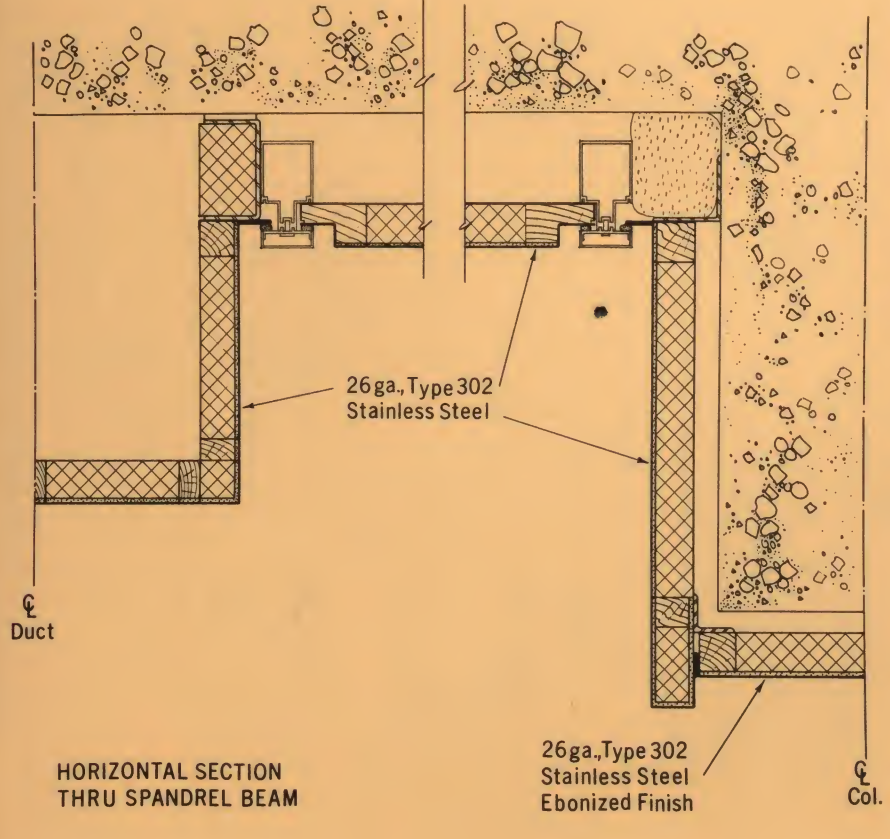
Architects: Shore and Moffat and Partners

Fabricator: Macotta Company of Canada Ltd.

Drawing courtesy Royal Architectural Institute of Canada Journal







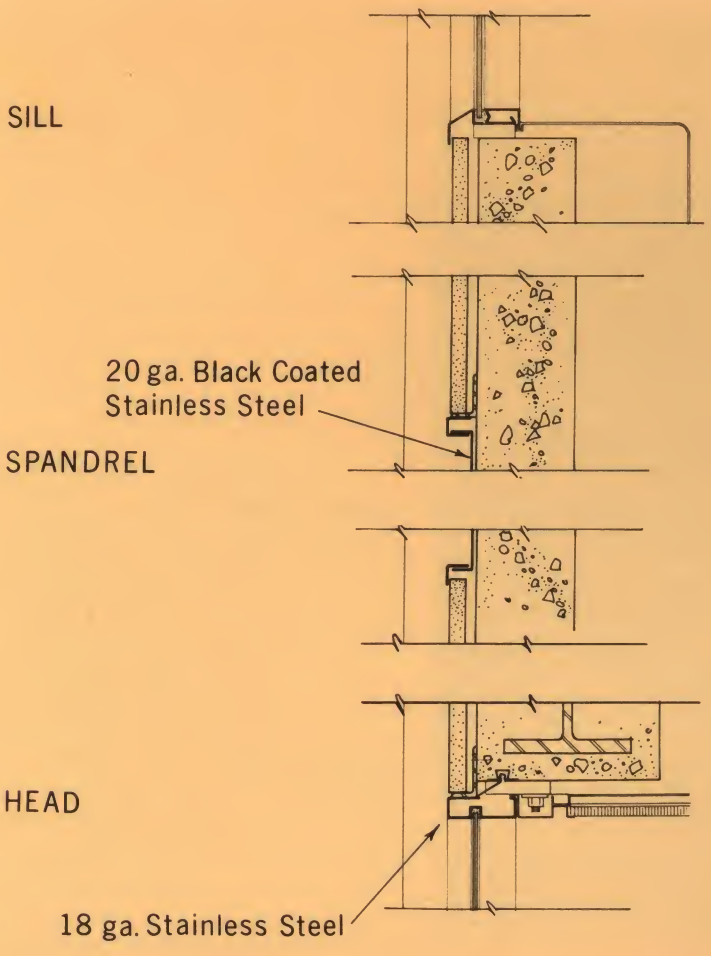
HORIZONTAL SECTION
THRU SPANDREL BEAM

Stainless steel spandrels on the Canadian National Terminal Building, Moncton, New Brunswick, combine a colored and highlighted panel with a bright panel. Upper area is colored with a black acrylic coating, textured with a shallow cross-like pattern, and highlighted. The lower area has a No. 4 finish, while the trough between them is black coated stainless.

Architects: Greenspoon, Freedlander and Dunne

Curtain wall fabricator: Kawneer Company Canada Ltd.

Spandrel fabricator: Dalite Corporation (Canada) Ltd.



Spandrels of the Insurance Securities Building, San Francisco, combine black color-coated stainless steel, Type 316, with white and black granite. The whole spandrel is framed in slender members of stainless steel.

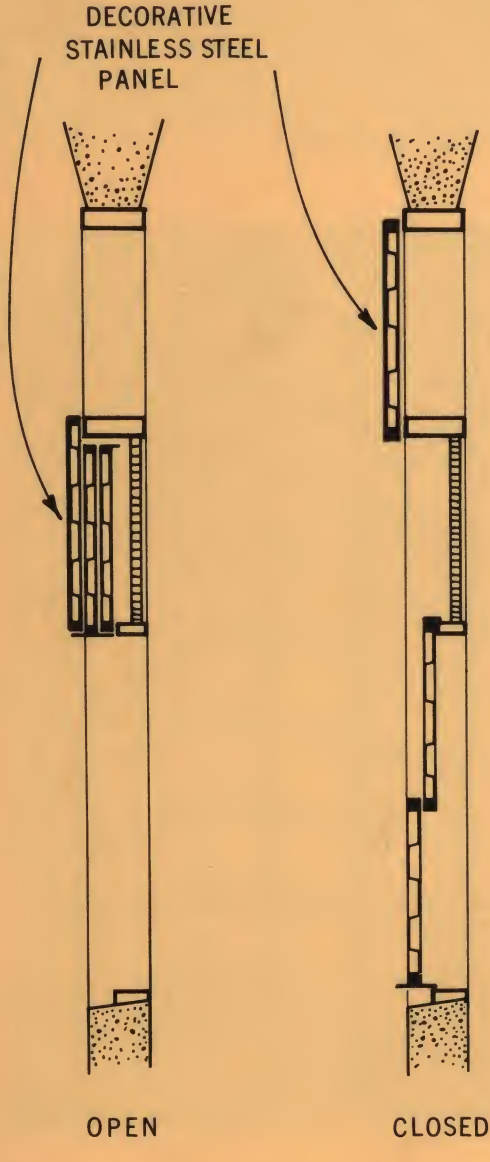
Architects: Welton Becket and Associates

Fabricator: Universal Corp.

Functional spandrels of Type 430 stainless steel protect and accent the window wall of Otto Richter Library, University of Miami, Coral Gables, Fla. Colored with a gray coating, textured and highlighted, the spandrels double as hurricane screens. When high winds threaten the wide glazed areas, the decorative stainless panel is raised to cover the clerestory, permitting inner screens of corrugated aluminum, which have been protected by the stainless steel from the salty air of the Miami area, to drop over the lower part of the window.

Architects: Watson, Deutschman & Kruse

Fabricator: Window Master Corp.



26525M Printed in

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 13

Committee of Stainless Steel Producers • American Iron and Steel Institute
150 East 42nd Street, New York, N.Y. 10017

(1965)

STAINLESS STEEL ROOFING

The chief function of a roof—to provide protection for the building interior and its contents against all kinds of weather and wind conditions—is best achieved when the roofing material also withstands the effects of corrosive atmosphere and remains serviceable over a period of time that makes the material economically feasible—if possible the life of the building.

In addition to long-term economy measured in terms of durability, a roofing material must also be evaluated on the basis of its initial installation cost. Rapid installation provides a significant savings in construction costs, while easy maintenance and elimination of replacement needs reduces long-term maintenance expenses.

Appearance is also an important consideration, particularly when the roof is visible from the ground. It should be attractive and harmonize with the architectural style of the building and other materials used.

STAINLESS STEEL MEETS ALL REQUIREMENTS

The stainless steels are superior materials for meeting all these requirements. Highly resistant to corrosion, stainless roofs are unaffected by weather and virtually all corrosive atmospheres—important factors in both durability and appearance. The metal's high strength-to-weight ratio means thinner material can be used.

Stainless roofs are long-lasting and require little or no maintenance. What is believed to be the first stainless steel roof was installed in 1924 on the Pittsburgh Plate Glass Co. plant in Creighton, Pa. This roof is still in service and metallurgists who have examined it report that it is in excellent condition. Another early application of stainless roofing was on the Chrysler Building in New York, installed in 1929. After 30 years, the roof was visually bright, even though close inspection showed it to be covered with a dirt film. When the dirt was washed off, the metal underneath was as good as new. (See ASTM Proceedings, 1961.)

Stainless steel roofs will outlast roofs made of other materials currently in use. The actual life span of stainless roofs is unknown because, although they have seen service for over 40 years, they have not been in use long enough for metallurgists to determine the limit of their endurance. However, some authorities believe that stainless roofs will give 100 years of service. By contrast, "composition" roofing, which is the chief material currently employed, generally has a service life of 15 to 20 years. While most other roofing metals last longer than composition roofing, in localities with corrosive industrial atmospheres they cannot match stainless for durability.

Superior corrosion resistance is the chief reason for the longevity of stainless steel roofing. Under extreme conditions, where the roof is subject to heavy chemical fumes or ocean spray, the more highly corrosion resistant Type 316 is usually specified, whereas Types 302 or 304 are commonly used in usual industrial atmospheres.

Stainless steel's high corrosion resistance prevents the formation of corrosion products which can produce ugly stains on adjoining building materials. Further, the normal corrosive alkalis produced by other building materials have little or no effect on stainless. It is the most durable metal for use with other materials. To protect against galvanic corrosion, fasteners should also be of stainless steel.

The high strength-to-weight ratio of stainless is an important advantage in its use as a roofing material. This strength permits use of gages lighter than those required for other metals and makes the cost of stainless steel roofing competitive.

Stainless steel roofs maintain their attractive appearance and harmonize with the architecture of most buildings. These characteristics are particularly desirable if the roof is visible from the ground. Whether a bright, dull or patterned finish, the roof will retain its original appearance with minimum maintenance throughout its life.

Stainless roofing is easy to handle. The lightweight sheets can be installed quickly by sheet metal workers experienced in metal roofing.

No. 13 of a series being published by the Committee of Stainless Steel Producers, American Iron and Steel Institute, 150 East 42nd Street, New York, N.Y. 10017. To receive future numbers or additional copies, simply write to the Committee.

METHODS OF INSTALLING STAINLESS STEEL ROOFING

Five methods can be used in applying stainless steel roofing:

1. *Batten Seam.* Normally used on roofs with large sloping areas, this installation method calls for the edges of stainless steel sheets to be folded over and fastened with clips to metal or wooden battens running parallel to the slope. The battens give extra rigidity to the roof membrane. The capping over the fasteners makes the roof weatherproof.

2. *Standing Seam.* Generally used on sloping areas, this method requires stainless sheets to be joined at the edges by a folded-over, upright seam which may be welded or caulked for watertightness. Seam is folded over twice ("double locked") for watertightness when not welded or caulked. When welded, this method can be utilized on flat roofs to give a watertight seam.

3. *Flat Seam.* This method is usually used at horizontal joints, valleys, and other areas where a higher, bulkier seam would not be attractive. The edges of the stainless sheet are folded over and flattened; the resulting seam may then be soldered or caulked.

4. *Diamond Tile.* In this method, many steps can be completed in a sheet metal shop, making field installation simple and inexpensive. It is used on sloping areas and frequently specified for churches and institutional buildings. The individual tiles are secured by placing an anchored clip over one flange and interlocking all sides with adjacent tiles. Tiles can be installed easily on difficult roof areas, including spires, because their small size permits flexible layout.

5. *Industrial (Corrugated).* This method is used primarily for industrial plants. The corrugated sheets give strength to the roof and no underlying deck is required. The edges of the sheets overlap and are secured to each other by screws. The ridge is capped with formed stainless sheet to make the roof watertight.

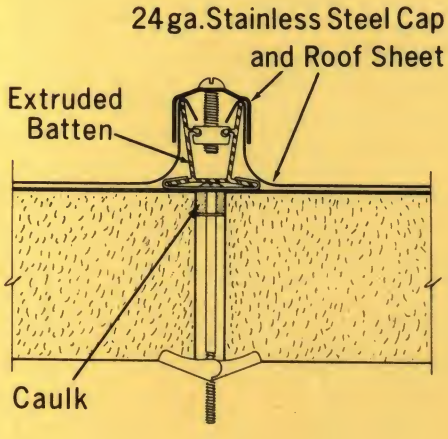
(Specifications should require soldered seams to be washed with a neutralizing soda, then rinsed with water. This precaution eliminates the corrosive effects of the flux.)

METAL BATTEN SEAM

The spire and main roof area of St. Joseph's Church, Sharon, Pa., are finished with stainless steel using metal batten seam method of installation. The roof is Type 302 stainless steel, 24 gage (.025") with No. 2D finish. In addition to its attractive appearance, stainless steel was specified to withstand the corrosive atmosphere present in an industrial area.

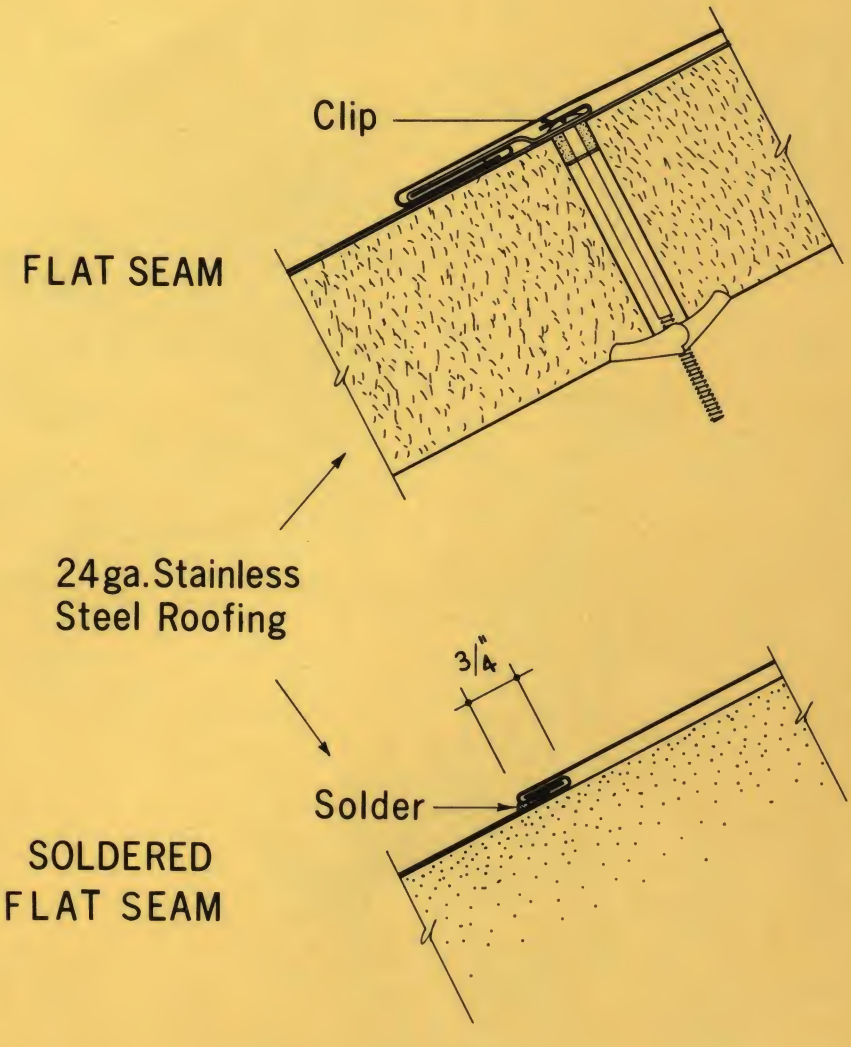
Architects: Stickle and Associates

Fabricator: Overly Manufacturing Co.



FLAT SEAM

An effective use of the flat seam installation method appears over the archways of St. Joseph's Church. This method used on the flat areas of the roof assures a watertight job and permits a smooth line to be visible above the archways.



FLANGING COIL STOCK

SPOT WELDING TO CLEATS

CONTINUOUS WELD OF SEAM

FOLDING FOR WATERTIGHTNESS

STANDING SEAM—WELDED

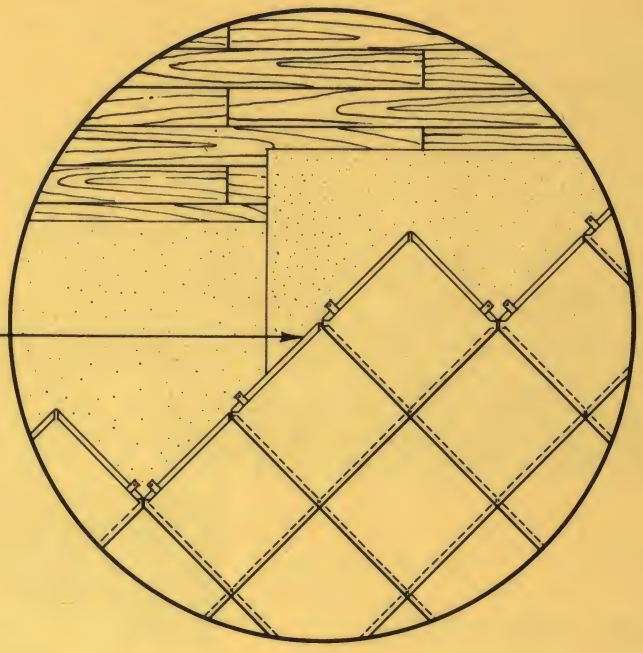
The attractive stainless steel roof of the Swedish Pavilion at the New York World's Fair has both flat and sloping areas. Welded standing seams were made with automatic welding equipment, developed by the Swedish firm Fagersta Bruks A. B., and now available in North America. The equipment can also be used for vertical surrounds. The stainless steel is Type 302 with No. 2B finish, 30 gage (.012"). Stainless steel was specified for the roof of this international showcase because of its contemporary appearance and its ease of application.

Architect: J. L. O'Brien
and Associates

Fabricator: Wolkow-Braker
Roofing Corp.

Patented welding unit makes continuous weld along length of each seam.

18" x 18"
Stainless Steel
Shingle/Tile



DIAMOND TILE

St. Athanase Church in Iberville, Quebec, was re-roofed using the "diamond tile" method with stainless steel strip. Stainless steel is Type 301, 28 gage (.016") in a textured finish with random pattern. In view of the rural location of the church, the corrosion resistance of Type 301 was regarded adequate for this installation.

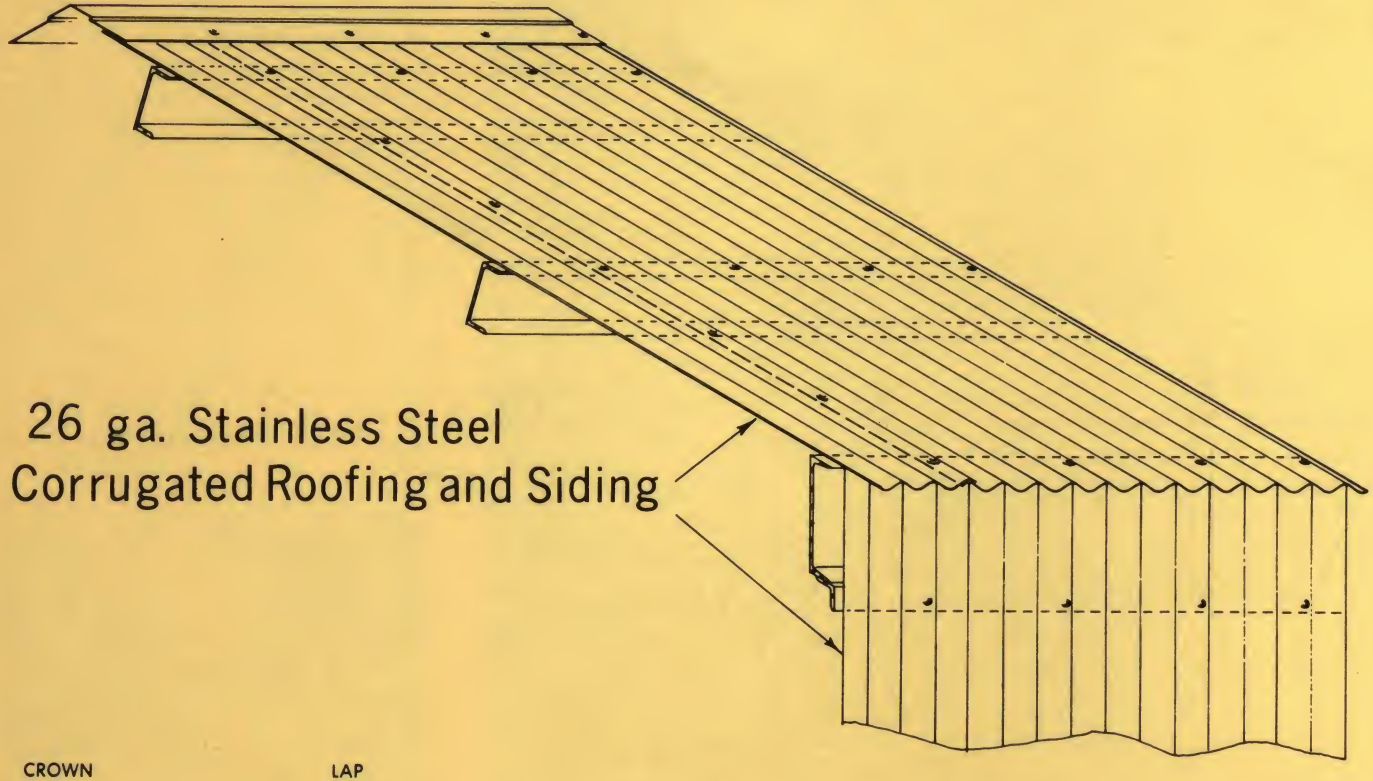
Contractor: Andre Greendale

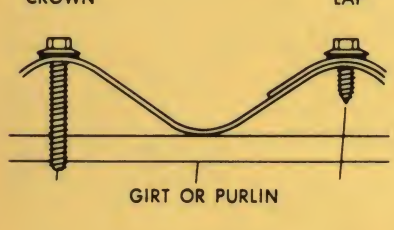
INDUSTRIAL—CORRUGATED

The stainless steel roof on a building of Nassau Smelting and Refining Co., Inc., Staten Island, N.Y., resists deterioration from the highly corrosive atmosphere of the surrounding industrial area, and from the fumes generated inside the plant. The stainless steel is one of the chromium-nickel AISI 300 series with a satin-like, cold rolled finish. Both roofing and siding are 26 gage (.019") sheet.

Erector: Chris Andersen Erecting Co., Inc.

Fabricator: Steelite Buildings, Inc.





The following companies are represented on the Committee of Stainless Steel Producers: Allegheny Ludlum Steel Corporation; Armco Steel Corporation; Atlas Steels Company Ltd., N. A.; Crucible Steel Company of America; Jones & Laughlin Steel Corporation, Stainless and Strip Division; Joslyn Stainless Steels; McLouth Steel Corporation; Republic Steel Corporation; Sharon Steel Corporation; The Babcock and Wilcox Company, Tubular Products Division; The Carpenter Steel Company; United States Steel Corporation; Universal-Cyclops Specialty Steel Division, Cyclops Corporation; Washington Steel Corporation.

Cooperating Alloy Suppliers: Climax Molybdenum Company; Falconbridge Nickel Mines Ltd.; Pittsburgh Metallurgical Company, Division Air Reduction Company, Inc.; Sherrit Gordon Mines Ltd.; The International Nickel Co., Inc.; Union Carbide Corporation, Metals Division; Vanadium Corporation of America.

76525M Printed in U.S.A.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO.14
Committee of Stainless Steel Producers • American Iron and Steel Institute
150 East 42nd Street, New York, N.Y. 10017
(1965)

STAINLESS STEEL FASCIA

The purpose of a wall fascia is to provide a functional transition between roof and wall surfaces and to serve as an exterior design element delineating the building wall. Fascia also serves as an independent decorative element when used for such applications as marquee fronts and facings above window walls.

Because fascia is an appearance feature whether as part of a functional component—gravel stops or copings—or as a purely decorative element—on a marquee—it is desirable that it be fabricated from a permanent material that will retain its like-new appearance over an extended period of time.

STAINLESS STEEL MEETS ALL REQUIREMENTS

The stainless steels meet all requirements for fascia:

• Their high resistance to corrosion assures a permanently attractive surface by preventing pitting and discoloration. This is a distinct advantage in fascia applications because of the aesthetic function.

Stainless steels Types 302 and 304 are used when general urban or industrial conditions exist. Under extreme conditions, where the fascia is subject to chemical fumes or salt air environment, the more highly corrosion resistant Type 316 is utilized.

• Because stainless steel does not deteriorate, it is easy to maintain and never needs replacing. This is important because fascia is often located in hard-to-reach areas. Also, stainless steel does not produce corrosion products that would stain surrounding materials and create additional cleaning problems.

• Since the corrosive action of alkalis has little or no effect on stainless steel, it can be used in contact with brick, stone and mortar.

No. 14 of a series. To receive future numbers or additional copies, write to the Committee of Stainless Steel Producers. Permission is granted to reproduce any of this material.

• Stainless has a relatively low coefficient of thermal expansion—close to that of non-metallic materials and lower than most non-ferrous metals. This means that stainless steel fascia will not be greatly affected by temperature change and will not expand or contract significantly, thus helping to prevent bulging or "waviness" along its surface.

EASE OF FABRICATION

Stainless steel fascia can be made in a variety of shapes, since stainless can be formed by all usual metalworking methods, including brake and roll forming, and can be readily soldered, welded, or brazed. When there are no load-bearing requirements, on-the-job soldering helps to speed installation. To allow faster job-site application, fascia may be designed so that it can be prefabricated at a sheet metal shop.

FASCIA DESIGN SUGGESTIONS

There are several design procedures the architect can adopt to avoid distortion or "waviness" when specifying stainless steel fascia:

1. Use a non-reflective matte finish to minimize optical distortion.

2. When a reflective finish is required, use stiffening members behind the fascia or laminate the metal to a rigid material such as plywood or composition board.

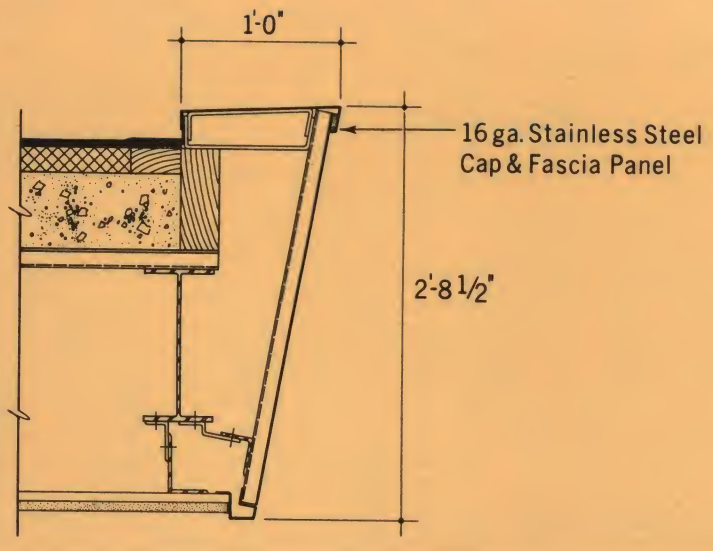
3. Specify textured or ribbed sheet or strip. The mechanical deformation will make the metal more rigid and will break up reflections.

A. Power Vista, the visitor's building at the Robert Moses Niagara Power Plant (background), utilizes stainless steel fascia, 16 gage (.063"), with non-reflective finish on the marquee of the overlook lobby roof. Fascia on entrance building (foreground) is also non-reflective stainless steel. Because the building is the "showcase" for the enormous generating center, highly corrosion-resistant Type 316 stainless was selected by the architects to keep the fascia and other areas attractive even though exposed to corrosive atmosphere caused by neighboring chemical plants.

Architect: Daniel Chait

Consulting Architect: John B. Peterkin

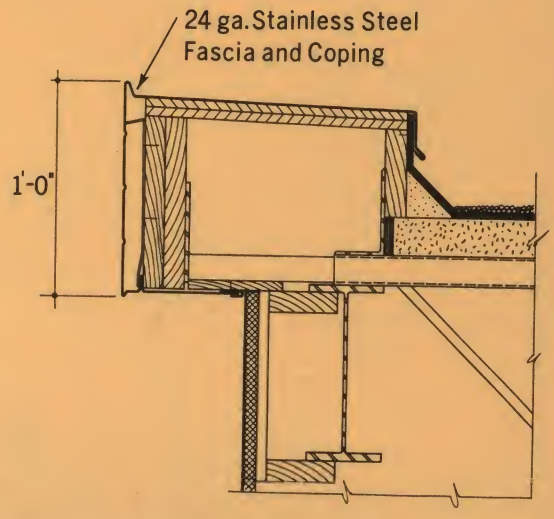
Fabricator: Trio Industries Inc.



B. Stainless steel coping and fascia is featured on curved roof line of high school in Hollidaysburg, Pa. Type 302 stainless steel, 24 gage (.025") with a satin-like finish, was specified to enhance the appearance of the school and avoid formation of corrosion products which could be washed down by rain and stain the sidewalk beneath the entrance marquee. Stainless is grooved for greater rigidity.

Architect: Hunter, Campbell and Rea

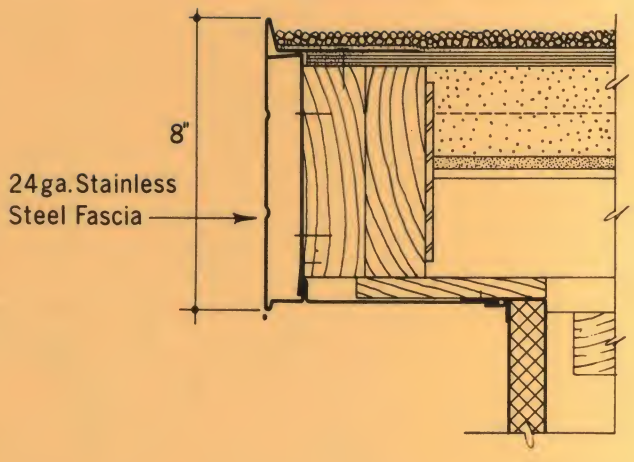
Fabricator: Dawson Metal Co. Inc.



C. Stainless steel fascia and gravel stop on Bishop Carroll High School, Ebensburg, Pa., is ribbed to prevent waviness on long sweep of straight, flat roof line. Type 302 was specified by the architects to prevent corrosion stains on surrounding materials, particularly on the white porcelain enamel immediately below the fascia. The gleaming metal is 24 gage (.025") with a satin-like finish.

Architect: Hunter, Campbell and Rea

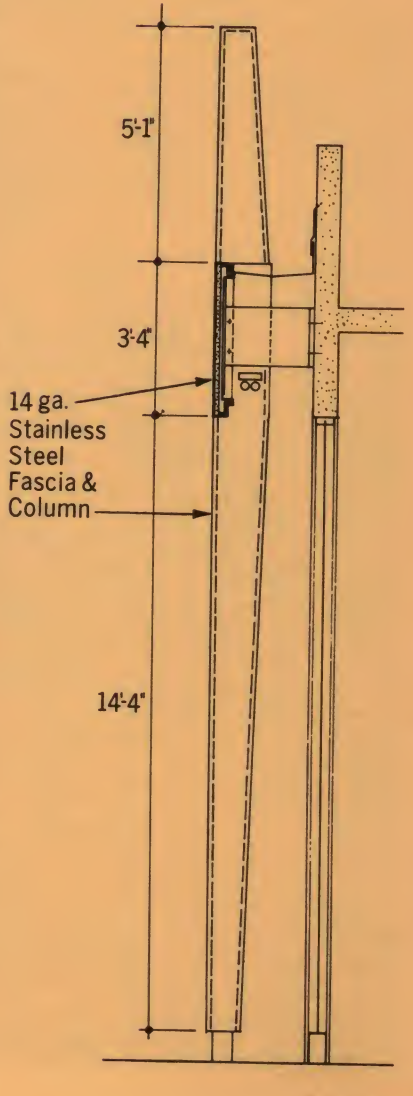
Fabricator: Dawson Metal Co., Inc.



D. Stainless steel fascia adds beauty to the first floor facade of New York's Americana Hotel. In addition to its inherent beauty, stainless steel resists the chemical-laden New York City atmosphere. The architects selected stainless because they felt that other materials would deteriorate and mar the appearance of the luxury hotel. The stainless used is Type 304, 14 gage (.078"), with No. 4 finish. Rigid backing of the metal avoids distortion.

Architect: Morris Lapidus, Liebman and Associates

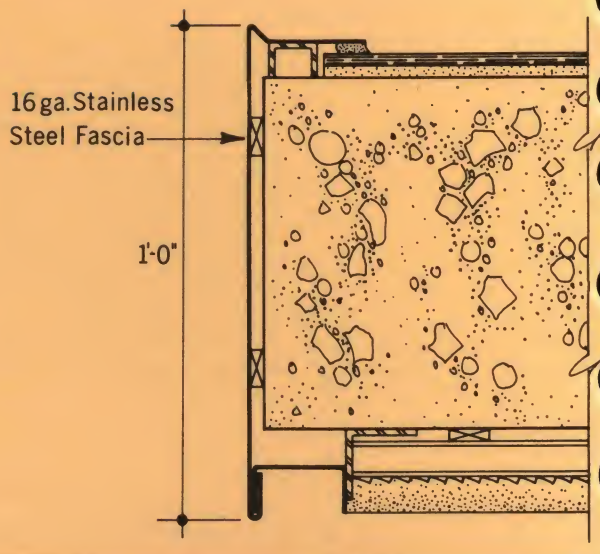
Fabricator: Allied Superb Bronze Corp.



E. Fascia on roof above terrace on the fifteenth floor of the Hall of Records in Los Angeles is Type 302 stainless steel, 16 gage (.063") with No. 7 finish. The highly reflective surface was chosen by the architects to match the sheathing of the window wall columns and to "give a classical beauty" to the exterior of the building. The fascia is rigidly backed to eliminate visual waviness.

Architects: Neutra and Alexander, Honnold and Rex, James Friend, H. C. Light.

Contractor: A. J. Bayer Co.



The following companies are represented on the Committee of Stainless Steel Producers:

Allegheny Ludlum Steel Corporation
Armco Steel Corporation
Atlas Steels Company Ltd., N. A.
Crucible Steel Company of America
Jones & Laughlin Steel Corporation, Stainless and Strip Division
Joslyn Stainless Steels
McLouth Steel Corporation
Republic Steel Corporation
Sharon Steel Corporation
The Babcock and Wilcox Company, Tubular Products Division
The Carpenter Steel Company
United States Steel Corporation
Universal-Cyclops Specialty Steel Division, Cyclops Corporation
Washington Steel Corporation

Cooperating Alloy Suppliers:

Climax Molybdenum Company
Falconbridge Nickel Mines Ltd.
The International Nickel Co., Inc.
Pittsburgh Metallurgical Company, Division Air Reduction Company, Inc.
Sherrit Gordon Mines Ltd.
Union Carbide Corporation, Metals Division
Vanadium Corporation of America

"Quality from American Labor"

Printed in U.S.A. 126

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 15
(1965)
Committee of Stainless Steel Producers • American Iron and Steel Institute
150 East 42nd Street, New York, N.Y. 10017

STAINLESS STEEL IN CURTAIN-WALL MULLIONS

A great variety of designs have developed in the metal-framed curtain wall as a means of achieving variations in texture, depth, color and shading. In most of these designs, mullions form a basic element, since their detailing determines the depth, shading, and directional treatment of the building's surface. Furthermore, mullion design can be a factor in providing strength against wind load, sealing out weather, holding windows and spandrels in place, and giving vertical rigidity to the wall.

Often mullions are designed to fulfill additional functions. Deep mullions are used as vertical sun shades to ease the burden on the building's air cooling equipment, while shallow mullions are often designed specifically to facilitate the passage of rain and air currents needed in natural cleaning. Tracks for window-washer scaffolding have been successfully integrated into mullion designs. In many structures, the mullions serve to express structural members such as columns.

DESIGNING IN STAINLESS STEEL

Of all the materials available to architects, stainless steel stands out as ideally suited for use in mullions because:

• It can be fabricated into a wide variety of designs through either brake-forming or roll-forming, and is available in a variety of extruded shapes. Its high strength permits the use of lighter gages than with other metals.

• The corrosion resistance of stainless steel gives long life to mullions formed from the metal. With minimum maintenance, stainless mullions retain their brightness permanently, and often rain is the only cleaning action needed.

• Stainless steel has an attractive appearance that blends well in a great variety of designs. Stainless mullions form bright highlights on a curtain wall while their neutral color mixes well with other parts of the structure —spandrels, coping, columns, fascia, etc.—whether they are formed from stainless steel or other building materials.

• A broad selection of finishes and surface treatments are available in stainless steel. The most widely used mill finishes in mullions are No. 2D, a dull non-reflective finish, No. 2B, a bright finish with some reflectivity, and No. 4, a bright satin-like finish. Textured and color coated stainless are also used in mullion design. Data Sheet No. 6, *Stainless Steel Finishes*, gives further details on available surface treatments of stainless steel.

DESIGNING FOR ECONOMY

When designing mullions in stainless steel, the architect can take maximum advantage of the metal's properties to achieve cost economies if he consults a stainless steel producer and/or an experienced fabricator. Information is available from both sources on minimum gages adequate to meet design requirements, and advice can also be provided on the most economically formed shapes. Commercially available roll-formed or tubular shapes are well suited to many mullion applications and can result in additional cost reductions without sacrifice of job quality. Tubular configurations have the added advantage of greater rigidity.

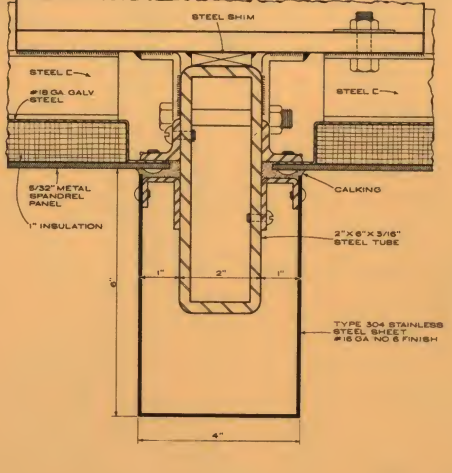
The architect can take maximum advantage of stainless steel's ability to resist corrosion by specifying stainless steel fasteners for joining mullion sections. Other metals should not be used for fasteners, since they may deteriorate due to galvanic corrosion and can cause unsightly bleeding at the joints. Heavy corrosion of fasteners, of course, will weaken the mullion installation.

No. 15 of a series. To receive future numbers or additional copies, write to the Committee of Stainless Steel Producers.

Stainless steel mullions of the Vermont Federal Building, Baltimore, Md., form a strong vertical accent. Soft, satin No. 6 finish on the mullions used in conjunction with matte-finish spandrels gives a three-dimensional effect to the wall. Stainless was selected by the architect for its strength and ease of maintenance. Mullions are simple channels of 16 gage (.063") Type 304 stainless, and their low profile permits rain water to wash freely over the curtain wall.

Architect: Edward Quigley Rogers

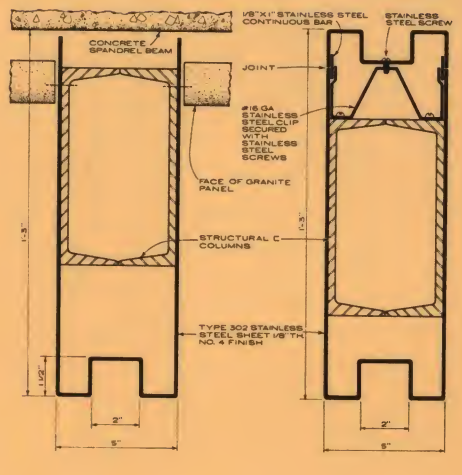
Fabricator: Trio Industries Inc.



Mullions framing entrance facade of the Decatur Federal Building, Decatur, Ga., were designed by the architect to "give a vertical accent to the building's first two floors and create a rhythm across the face." Fabricated from Type 302 stainless steel sheet ⅛ inch thick, the mullions were made in sections, welded on site, and the welds ground and polished to blend into the No. 4 finish. Stainless was chosen for its permanent beauty and ability to blend with other materials — black granite, cream colored marble, and gold anodized aluminum.

Architect: Pope H. Fuller

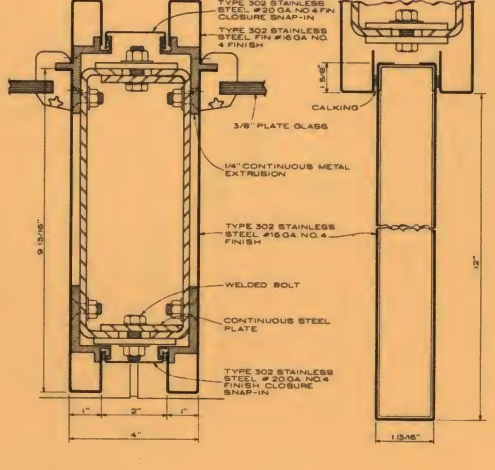
Fabricator: Emrock Metal Corp.



Vertical sun shades on the east, south and west elevations of the Moody National Bank, Galveston, Texas, form a part of the window-wall mullions and are formed of 16 gage (.063") Type 302 stainless steel with a No. 4 finish, joined to a core of stainless steel honeycomb for rigidity. Stainless steel was selected because of its ability to stand up with light maintenance in the highly corrosive atmosphere of the Gulf Coast. Weekly hosing by the bank's maintenance crew furthers the metal's corrosion resistance by removing salt-spray deposits from the window wall.

Architects: Golemon and Rolfe

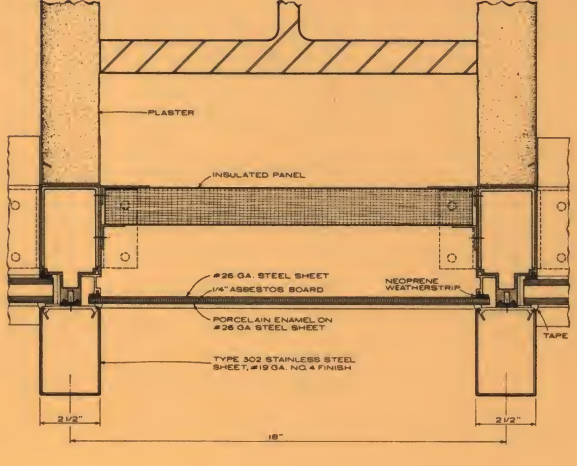
Fabricator: Overly Manufacturing Co.



A strong vertical design accent is given to the wall of Foundation House, Toronto, Ontario, by bright, permanent stainless steel mullions with a No. 4 finish. These are also used to delineate the building's structure; structural columns supporting Vierendeel trusses at roof are outlined by stainless steel framing a strip of black porcelain-on-steel. Fabricated from Type 302 stainless steel, 19 gage (.041"), the mullions fit over a stock wall framing system. In this position they not only protect the under-frame from corrosive attack, but they add structural strength and rigidity to meet windloading requirements.

Architect: K. R. Cooper

Fabricator: Kawneer Company Canada Ltd.



The following companies are represented on the Committee of Stainless Steel Producers:

Allegheny Ludlum Steel Corporation
Armco Steel Corporation
Atlas Steels Company Ltd., N. A.
Babcock and Wilcox Company, Tubular Products Division
Carpenter Steel Company
Crucible Steel Company of America
Jones & Laughlin Steel Corporation, Stainless and Strip Division
Joslyn Stainless Steels
McLouth Steel Corporation
Republic Steel Corporation
Sharon Steel Corporation
United States Steel Corporation
Universal-Cyclops Specialty Steel Division, Cyclops Corporation
Washington Steel Corporation

Cooperating Alloy Suppliers:

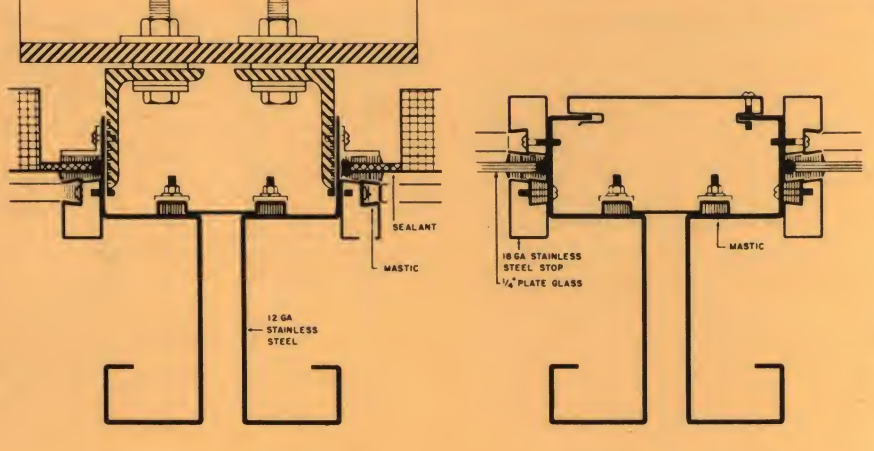
Climax Molybdenum Company
Falconbridge Nickel Mines, Ltd.
The International Nickel Co., Inc.
Pittsburgh Metallurgical Company, Division Air Reduction Company, Inc.
Sherrit Gordon Mines Ltd.
Union Carbide Corporation, Metals Division
Vanadium Corporation of America

"Quality from American Labor"

Functional design of Harris Trust and Savings Bank, Chicago, Illinois, makes use of open channel-shaped stainless steel mullions formed of Type 302 stainless steel, 12 gage (.109"), with a No. 4 finish. Instead of installing mullions and spandrels separately at the job site, mullions were designed in halves and integrally fabricated with the stainless spandrel panels in the factory. This permitted faster erection, control over sealants, and lower installation costs.

Architects: Skidmore, Owings and Merrill

Fabricator: General Bronze Corp.



Printed in U.S.A.

STAINLESS STEEL ARCHITECTURAL DATA SHEET NO. 16
Committee of Stainless Steel Producers • American Iron and Steel Institute
150 East 42nd Street, New York, N.Y. 10017
(1966)

STAINLESS STEEL BUILDING IDENTIFICATION

On many building projects, it is essential that signs, letters, insignia, and other types of building identification be provided. Since these are visual elements and must be designed for good visibility, without sacrificing design integrity, material selection is an important consideration.

Stainless steel is particularly well suited to meet the criteria for building identification, because:

1. It resists corrosion and in normal urban and industrial atmospheres will maintain its original appearance for the life of the building. Further, it will not cause staining of adjacent portions of the structure.
2. Since it requires no protective coating and is resistant to pitting and discoloration, stainless steel requires no special maintenance program. In most instances the normal washing action of rain will keep it in like-new condition.
3. With the wide variety of mill finishes and textures available in stainless steel, ranging from a dull matte to a mirror polish, and including patterned, color-coated and high-lighted surfaces, a selection can be made which will harmonize with any building material.

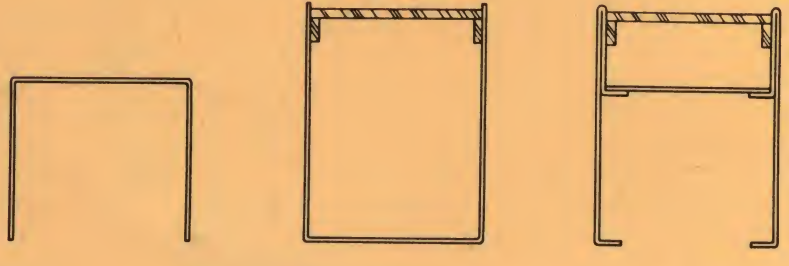
(Further information on stainless steel finishes and surface treatments can be found in STAINLESS STEEL ARCHITECTURAL DATA SHEET No. 6.)

FABRICATED LETTERS

Metal letters for building identification may be cast, cut from metal plate, or fabricated from sheet metal. Fabricated letters are preferred for weight saving and economy, especially when the letters must be large. Fabricated letters are made with channel-shaped sections, but have an appearance of solidity. Almost all stainless steel signs and letters are of this type, rather than cast or cut from plate, and stainless is an ideal material for this purpose. Its high strength and rigidity permit the use of light gage metal even for large letters, thus keeping weight at a minimum.

Stainless steel letters are available from fabricators of metal letters in many stock patterns and custom designs. While fabricated letters are usually made on order, those selected from the broad variety of stock patterns available often represent a cost saving over letters fabricated from the architect's own designs. However, if a custom design is preferred, it can usually be made at a modest cost premium. Manufacturers recommend that such designs have a flat face, since contoured or prismatic designs greatly increase fabrication costs.

Fabricated in welded or soldered channel sections, stainless steel letters can be mounted in the inverted position to present a solid appearance, or with the open face outward, permitting a colored facing material or illumination (or both) to be installed. A half-channel or H-form section is sometimes used to facilitate mounting illumination close to the surface.



Letter Sections:
A. inverted channel
B. channel
C. semi-channel or H-channel

Block letters on a jewelry store in Niles, Mich., have Gothic type face. Type 302 stainless steel, 20 gage (.036 inch) with a No. 4 finish, was used.

Fabricator:
Nelson Harkins Industries, Inc.

Ribbon letters on the Johnson Wax plant in Long Island City, N.Y., are suspended from a mounting bar for easy installation. Condensed Gothic letters were fabricated from 20 gage (.036 inch) Type 302 stainless steel with a No. 4 finish.

Fabricator:
United States Bronze Sign Co., Inc.

LETTER STYLES

Among the stock letter patterns available from fabricators is a variety of type faces, including Roman, Futura, Gothic, and many others, in both condensed and extended variations. All these faces fall into two basic types: block letters, in which the breadth of face is equal to or greater than the depth of the section; and ribbon letters, in which the depth is greater than the breadth.

Three types of mounting can be used to attach letters to a structure: flush, projected or free-standing. When the letters are exposed to the weather, manufacturers generally recommend that flush mounting not be used, since it does not provide for drainage behind the letters and dirt streaking of the surface may result, due to rain wash. To provide the appearance of flush mounting in an exposed location, and at the same time allow for rear drainage, the letters can be projected a minimum of ¼-inch from the building face.

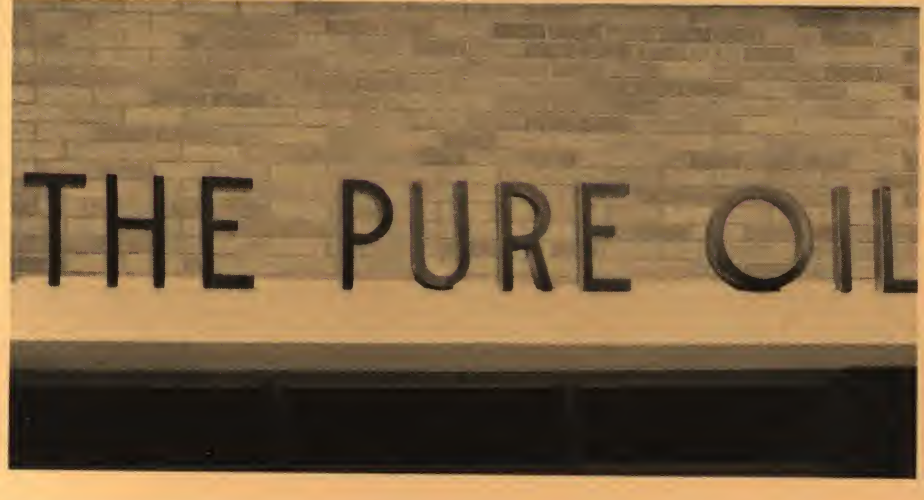
Projected mounting, in which the letters are separated from the building face by a bracket or clip, is often specified when deep shading is desired to make the letters stand out. Free-standing mounting, in which the letters are fastened to a continuous bar or channel either at their base or top, gives the letters a more prominent, independent appearance and is especially appropriate for use at the edge of set-backs, marquees, and overhangs. Free-standing letters can also be shop assembled and mounted in a single operation.

Flush mounted appearance is given to block letters over entrance to tunnel on West Virginia Turnpike, south of Charleston, by projecting them only ¼-inch from masonry. Letters were fabricated to custom design from 16 gage (.060 inch) Type 302 stainless steel with No. 4 finish.

Fabricator: Colonial-Hites Company

Projected mounted letters stand out 1½ inches from the black brick facade of an Atlanta, Ga., clothing store. Custom designed letters, modeled after a Roman type face, are fabricated from 20 gage (.036 inch) Type 302 stainless steel with a No. 4 finish.

Fabricator: Spanjer Brother, Inc.

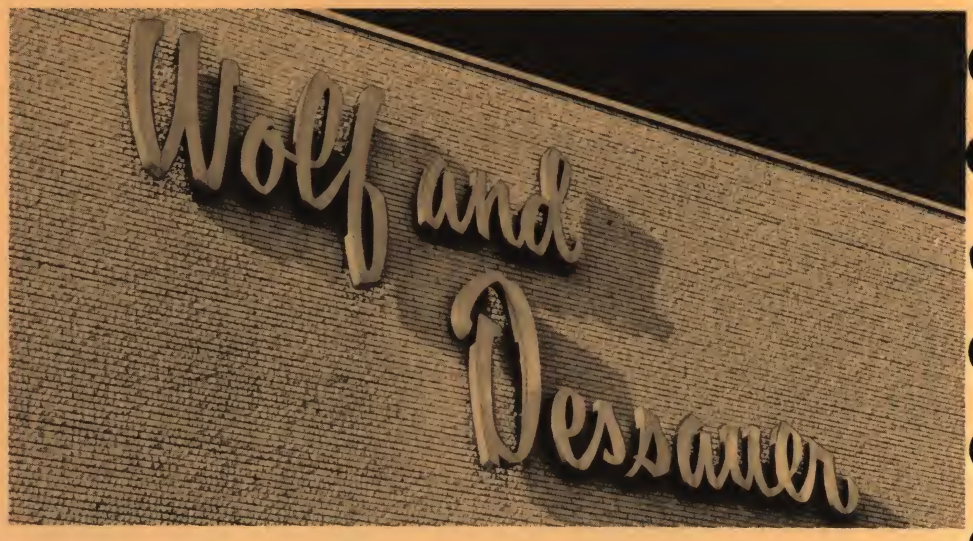


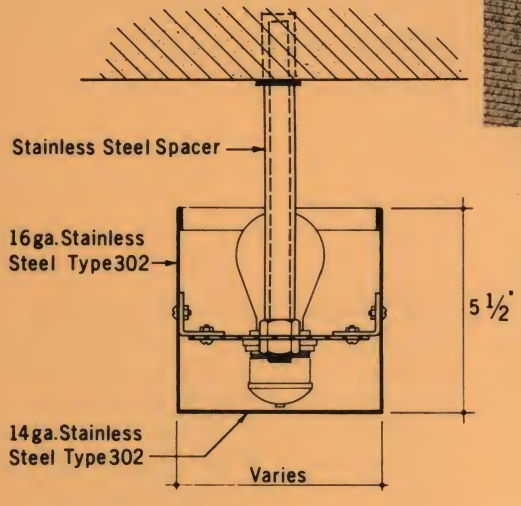
Free standing letters are mounted on the marquee over the entrance to Pure Oil Company's Eastern Division Office in Detroit. Gothic ribbon letters were fabricated from 20 gage (.036 inch) Type 302 stainless with a No. 4 finish.

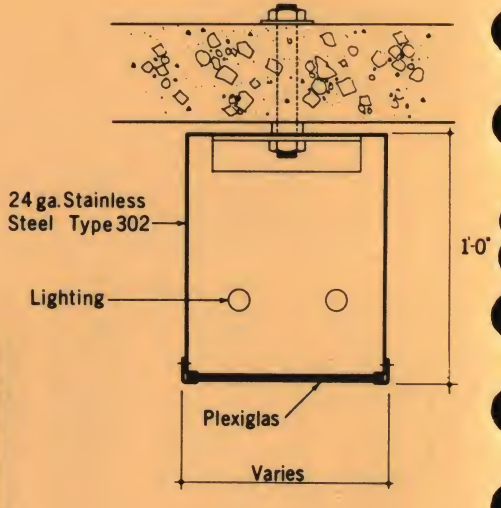
Fabricator:
Nelson Harkins Industries, Inc.

Custom designed sign, illuminated by reflected light, identifies Wolf and Dessauer department store in Fort Wayne, Ind. Fabricated from Type 302 stainless steel with a No. 4 finish, the letter faces are soldered to the sides. White porcelain enamel baffles and electric lamps are set in the open backs of the reverse channel letters for back lighting.

Fabricator: Arros Sign Company







Sign formed of stainless steel channel with illuminated red plexiglass face identifies the plant of the Coca-Cola Bottling Company, San Diego, Calif. Letters are formed from 24 gage (.024 inch) Type 302 stainless with a No. 4 finish, and are joined by spot welds and stainless screws.

Fabricator: California Neon Products

The following companies are represented on the Committee of Stainless Steel Producers:

Allegheny Ludlum Steel Corporation
Armco Steel Corporation
Atlas Steels Company Ltd., N. A.
Crucible Steel Company of America
Jones & Laughlin Steel Corporation, Stainless and Strip Division
Joslyn Stainless Steels
McLouth Steel Corporation
Republic Steel Corporation
Sharon Steel Corporation
The Babcock and Wilcox Company, Tubular Products Division
The Carpenter Steel Company
United States Steel Corporation
Universal-Cyclops Specialty Steel Division, Cyclops Corporation
Washington Steel Corporation

Cooperating Alloy Suppliers:

Climax Molybdenum Company
Falconbridge Nickel Mines, Ltd.
The International Nickel Co., Inc.
Pittsburgh Metallurgical Company, Division Air Reduction Company, Inc.
Sherrit Gordon Mines Ltd.
Union Carbide Corporation, Metals Division
Vanadium Corporation of America

"Quality from American Labor"

Printed in U.S.A. 6662